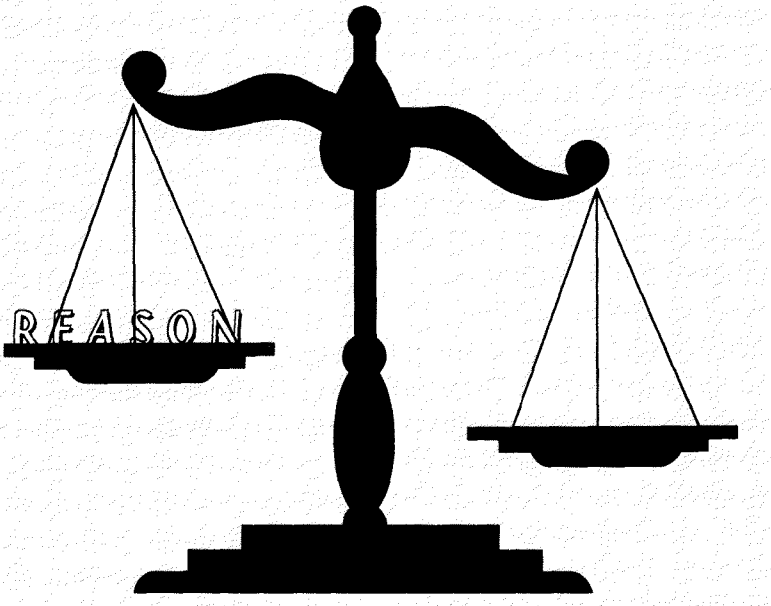
Creation/Evolution



Issue 39 Winter 1996

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About this issue. . .

Issue 39 of *Creation/Evolution* is a landmark volume. It marks an important transition in the publications that we bring you from NCSE. Beginning in February, 1997, NCSE will reformat its periodicals to produce a combined publication devoted *both* to news and analysis. The articles and reviews that you have become accustomed to reading in *Creation/Evolution* will now appear in the same volume as the news, updates, and other features that make up *NCSE Reports*. We carried details of this transformation in *NCSE Reports* 16, no. 1: 10-11 in which NCSE Executive Director Dr. Eugenie C. Scott announced the decision of the NCSE Board of Directors to redesign our publications and discussed the reasons for the change. Prospective contributors should note the changes in style requirements for submissions to the new journal, *Reports of the National Center for Science Education*. These changes will go into effect with the first issue of 1997, Volume 17, number 1.

This final issue of *Creation/Evolution* is a good example of the variety and breadth of knowledge that our contributors and members bring to NCSE. Len Lieberman and Rodney Kirk wondered if students in their introductory courses on human evolution could recognize statements by religious organizations *in support of* evolution (as contained in NCSE's *Voice for Evolution*). They were surprised at how few *could* identify these sources correctly and found that it was not possible to predict how well a student would perform on this task based on the student's prior ideas on divine agency in life's history.

Philosopher Robert Pennock took a close look at lawyer Phillip Johnson's work, including Johnson's recent book *Reason in the Balance*. What Johnson (and many other creationists) fear and despise about evolutionary biology, writes Pennock, is that acceptance of evolution would strip the meaning from life. Pennock explores this contention and turns to the existentialists themselves for guidance to counter this concern.

In a commentary on the same volume, NCSE Editorial Board member Karl Fezer contends that the naturalism that Johnson calls the 'metaphysics' of modern biology is really more of an empiricism. The methodology of modern science is based on accumulating natural evidence and constructing hypotheses and theories drawn from these empirical observations.

In addition to the attention that Phillip Johnson attracts, Michael Behe has been gaining prominence lately with his book *Darwin's Black Box*. Kenneth Miller reviews Behe's "biochemical challenge to evolution" to conclude that it is little more than William Paley's 18th-century natural theology dressed up in 20th-century biochemistry. The current activity of Johnson and Behe, among others, should remind us that anti-evolutionists come in more than one variety and not *all* take a literal interpretation of Genesis as the basis for their arguments.

Daniel Blackburn reviews a very readable and wide-ranging book on dinosaur

continued on inside back cover

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Creation/Evolution

Volume 16 · No. 2 · Winter 1996

The journal of evolution and science education which explores aspects of evolution and anti-evolutionism

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The Trial of Darwin is Over: Religious Voices for Evolution and the "Fairness" Doctrine

Leonard Lieberman and Rodney C. Kirk
Central Michigan University

In this paper we describe a classroom procedure (high school and college) for confronting and clarifying the "fairness" (two-model) doctrine, as well as informing students that the trial of Darwin is over for a variety of religious organizations that have resolved this issue and voiced support for the teaching of evolution. The verdict on Darwin has been reached for millions of individuals. His body was interred in Westminster Abbey; his ideas have won broad acceptance.

The most recent notable announcement was in 1996 when Pope John Paul II announced to a meeting of the Pontifical Academy of Sciences, "... [T]oday ... fresh knowledge leads to recognition of the theory of evolution as more than just a hypothesis" (Pope John Paul II, quoted in the *Detroit Free Press* 1996: A1-A2).

The Pope was re-affirming an earlier declaration made in 1950, but adding that "fresh knowledge" supports the theory. The *Detroit Free Press* reported on the Pope's announcement under the caption: "Pope Backs Idea of Evolution," and on the following page the report continued with the headline: "Pope Sides with Darwin on Theory of Evolution." Yet, students may be uninformed or misinformed about the views of various religious organizations that accept science and evolution. Therefore, we propose use of a questionnaire by which they may receive that information, and do so in a way that is economical in its use of time and more memorable than a lecture.

Proponents of "scientific" creationism assert that fairness requires using the two-model doctrine which involves teaching "scientific" creationism whenever evolution is taught. Furthermore, Phillip Johnson, a professor of law, has put Darwin on Trial and concluded that it is not possible to support Darwin's evolution and "any meaningful theism" (1993: 162; see also Gish and Bliss 1981:8 and Gish 1995). Johnson denies that he is a creationist, but his view, like the two-model doctrine, can have the effect of persuading a religious believer to reject the scientific concepts in evolutionary biology, thus supporting a central purpose of "scientific" creationism.

Classroom Procedure

The presentation of a series of statements about evolution from prominent religious

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organizations and leaders is introduced to the students with this statement of purposes: 1) To inform or remind you (the student) that there is a centuries-old debate between some religions and science. One example of this debate is the two-model approach which contrasts the creation of the universe and humans (about 10,000 or 6,000 years ago in a span of six twenty-four hour days) versus biological evolution over millions of years; 2) to inform you that there is a wide range of religious viewpoints about creationism and biological evolution, therefore presentation of only one religious view to students is inherently unfair; 3) to clarify that a number of religious organizations find that there is no conflict between evolution and belief in a creator. It is useful to announce the purposes before distributing the list of statements. Informing the students in advance of those purposes does not seem to affect their answers to the survey.

The classroom procedure utilizes a set of quotations from the Gallup Poll and religious sources about the relation of religion and science. In the interest of informed consent students are also informed that they are not graded on their answers and no record is kept of individual responses. The first set of three of the statements (Table 1) is from the Gallup Poll and concerns creation by God, evolution with God's guidance, and evolution without God's participation. Students are asked to select the view closest to their own and write their choice on the top of an electronic answer sheet.

Table 1

Religions and Science*

Gallup Poll — What is your answer?	
A. God created man pretty much in his present form at one time within the last 10,000 years.	47%
B. Man has developed over millions of years from less advanced forms of life. God guided this process, including man's creation.	40%
C. Man has developed over millions of years from less advanced forms of life. God had no part in this process.	9%
D. No Answer/No Opinion/Don't Know	4%

Responses from national sample.

The remaining nine items (Table 2) are quotations from various religious organizations. One correct source is listed along with several incorrect sources. The students are asked to select an item among the listed choices. These are intended to alert the student to the second purpose listed above, concerning the wide range of religious views that are not in conflict with evolution and their relevance for the fairness issue.

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Table 2

Who Said It: A Multiple Choice Test on Religions and Science

1. "Cosmogony itself speaks to us of the origins of the universe and its makeup, not in order to provide us with a scientific treatise but in order to state the correct relationship of man with God and with the universe. Sacred scripture wishes simply to declare that the world was created by God, and in order to teach this truth, it expresses itself in the terms of the cosmology in use at the time of the writer ... The sacred book ... does not ... teach how heaven was made but how one goes to heaven."

1. Charles Darwin	(25)[1]
2. Patrick J. Buchanan	(16)
3. Bertrand Russell	(20)
4. Dale Carnegie	(8)
5. Pope John Paul II	(26)*

2. "Man learns from two books: the universe for the human study of things created by God; and the Bible, for the study of God's superior will and truth. One belongs to reason, and the other to faith. Between them there is no clash."

1. Charles Darwin	(25)
2. Pat Robertson	(26)
3. Bertrand Russell	(12)
4. Dale Carnegie	(6)
5. Pope Pius XII	(26)*

3. The Encyclopedia ... cites ... theologian George Forell's interpretation of "the doctrine of creation as expressing a theory not about the origin of the world" but as describing man's situation in the world.

1. Encyclopedia of the Episcopal Church	(4)
2. Encyclopedia of the Lutheran Church	(14)*
3. Encyclopedia of Agnosticism	(16)
4. Encyclopedia of Atheism	(7)
5. Encyclopedia of Humanism	(54)

4. Resolved to urge its constituents units "to join with others to have creation-science legislation declared unconstitutional when it is in violation of the First and Fourteenth Amendments to the U.S. Constitution."

1. American Civil Liberties Union	(47)
2. Society for Political Correctness	(15)
3. United Presbyterians	(18)*
4. Lutheran Church	(15)

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5. Affirmed "the glorious ability of God to create in any manner, whether men understand it or not, and in this affirmation reject the limited insight and rigid dogmatism of the 'Creationist movement'...."

1. Episcopalian (31)*
2. Unitarian (40)
3. Agnostic (23)

6. "We testify to our belief that the historic Christian doctrine of the Creator God does not depend on any particular account of the origins of life for its truth and validity ... The assumption that the Bible contains scientific data about origins misreads a literature which emerged in a pre-scientific age."

1. American Association for Advancement of Science (50)
2. United Church Board of Homeland Ministries (27)*
3. Episcopalian (18)

7. The General Assembly resolves to "uphold religious neutrality in public education ... and oppose efforts to compromise the integrity of public school teaching by the introduction of sectarian religious doctrines such as 'scientific creationism'...."

1. Unitarian Universalist (15)*
2. Michigan Education Association (13)
3. National Education Association (66)

8."Whereas, 'scientific' creationism seeks covertly to promote a particular religious dogma, ... Be it resolved that the ... Conference opposes efforts to introduce 'Scientific' creationism into the science curriculum of the public schools."

1. National Education Association (52)
2. American Association of University Professors (17)
3. United Methodist (26)*

9. "[T]he principles and concepts of biological evolution are basic to understanding science ... students who are not taught these principles, or who hear 'creationism' presented as a scientific alternative, will not be receiving an education based on modern scientific knowledge, . . . ignorance about evolution will seriously undermine their understanding of the world and the natural laws governing it, and their introduction to other explanations described as 'scientific' will give them false ideas about scientific methods and criteria."

1. American Association for Advancement of Science (59)
2. Biological Society of America (27)
3. Central Conference of American Rabbis (9)*

[1] Numbers in parentheses indicate the number of students in all classes choosing that response to the question.
* Indicates the correct source of the citation

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Answers are placed on an electronic answer sheet. After they complete the questionnaire and receive the correct answers, students are asked to write their comments on the back of the answer sheet. After the students make their selections, the correct sources are announced while students have the statements and their answer sheets in front of them.

Three classes were asked to complete the survey. Two were introductory classes in physical anthropology and one was an advanced class, all at a Midwestern university. The three classes responded in a similar pattern, permitting us to combine the responses in our analyses.

Table 3

Answers to Gallup Poll on Creationism/Evolution and Score on Series of Statements by Religious Leaders and Organizations

	Correct Answers		
Gallup Poll	0-2 % (N)	3-5 % (N)	Total % (N)
A. God created man pretty much in his present form at one time within the last 10,000 years	7 (7)	2 (2)	9 (9)
B. Man has developed over millions of years from less advanced forms of life but God guided this process including man's creation	37 (35)	14 (13)	51 (48)
C. Man has developed over millions of years from less advanced forms of life. God had no part in this process	16 (15)	13 (12)	28 (27)
No answers or combinations of ABC	4 (4)	7 (7)	12 (11)
TOTAL % (N)	64 (61)	36 (34)	100 (95)

Results

We illustrate the results by considering Question 1 in Table 2. The correct answer is Pope John Paul II. Twenty-seven percent of ninety-five students answered this correctly. As the correct sources were announced many students evidenced surprise by groaning or with

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pained facial expressions indicating that they did not expect a religious person or source to express that view. Or, as one student wrote in a comment: "Leave it to those turncoat Popes to throw a monkey wrench in the works."

The highest number of correct responses was five out of nine possible. But only two students out of 95 reached that level, while 68 percent (65) had scores of two or less. It is apparent that knowledge, or even intuitive guessing, about the views of major religious leaders and organizations is in very short supply. The result is that the university students in these classes seem very likely to conclude that the standard creationist view is supported by a large number of religions, possibly including their own. This occurred despite the fact that only 11.5 percent (10) of the students selected the creationist answer from the Gallup Poll. This low percentage is probably the result of the process of self-selection by students of a course concerned with evolution. We expect that students with confirmed creationist beliefs are less inclined to take a course about human evolution, simply because of its subject matter. Almost 51 percent (48) of students chose Gallup statement B combining evolution and God's influence, and over 28 percent (27) selected item C, evolution without God's participation in the process (11 percent no answer or marked combination of A, B, and C). (The 1991 national Gallup Poll percentages were A: 47%, B: 40%, C: 9%).

Cross-tabulation of score totals and answers to Gallup Poll items are shown in Table 3. Associations between answers on the Gallup poll and ability to identify the sources of the statements in Table 2 were not statistically significant ($p = 0.98$). Numbers are too small among students favoring creationism (Col. A) to make any comparative interpretation. Believing that "God had no part" in the evolutionary process (Col. C) did not seem to relate to being informed on religious views.

Student Comments

Did the survey achieve its purposes? Students' written comments reveal what the tabulations cannot. Students were asked to write down their reactions immediately after the sources of the statements were announced. These were later classified and read back to students to reinforce the purpose of the exercise.

A small number of students stated they did not understand the purpose and a larger number made comments indicating that they did. Among the former were these:

> I felt like I could not even make a guess .... I would probably have as good a chance if it were written in Chinese .... I didn't understand the point.
>
> I do not understand why we did this little poll. Also, I did not learn anything from it.
>
> What relevance does this have to our class right now?
>
> I would rather be watching chimp movies than doing this exercise!
>
> This poll assumes we know who all these people are and what these groups stand for in content.

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The last statement is the opposite of our assumptions. For the other students quoted above the statement of purposes was unheard or unpersuasive.

But a number of students made statements indicating that they did understand the intended purpose:

> This was an interesting exercise. It is interesting to find out who's [sic] beliefs included what. Some people are more liberal-minded than I thought.
>
> It was a good way to learn different organization's opinions about science/religion.
>
> I liked this procedure. Although I didn't know any of them at first, it was interesting to find out the right answers.
>
> I never realized how little I know about the connections between religions and science until today!
>
> [Regarding] the statements made by Pope Pius XII in his encyclicals, I had been unaware of this, despite 20 years of parochial education.

One purpose of this exercise was achieved for at least a portion of the class. Other responses expressed a variety of reactions. One expressed shock at the number of answers supporting Item A (Creationism) in the Gallup Poll. Several expressed support for both evolution and religion. Several more presented a statement of their religious positions, including one person's view that "...it's a shame that religion is being forced out of school." One person asked "What if I'm not Christian?" The authors recognize the omission and we are looking for quotable statements from other religions for a world-wide set of survey items (see Hanson and Hanson 1993).

That's Not Fair!

Phillip Johnson (1993) places emphasis on design in nature and stresses that the evolutionists' stress on the random nature of mutation and evolution cannot be reconciled with this design. Those religions that do so are not preaching "any meaningful theism" (p. 162). According to the nine statements quoted here (Table 2) he thereby classifies as meaningless theism the views of two popes, six Protestant organizations and the Conference of American Rabbis. The official views of these organizations would be excluded whenever the two-model doctrine of fairness is practiced. In such a model only evolutionary biology and "scientific creationism" would be taught, while all the other religions practiced in the United States would be excluded. That's not fair!

But if all these religious views are presented there would be inadequate time for teaching the science of evolution. That's not fair to the science itself and to the students who must live and work in a society that relies heavily on scientific and technological knowledge. The place for teaching about science is in the science classroom, laboratories, and field studies. The place for teaching about religion is in churches, homes, and classrooms designated for

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studying biblical literature and world religions. This kind of division of labor is fair to the constitutional separation of church and state and to the social principle of individual autonomy and freedom of religion.

Johnson's view that Darwinian "naturalistic metaphysics" (p. 162) and religion are necessarily in conflict contradicts his statement that "I believe that a god exists who could create out of nothing if He wanted to do so, but who might have chosen to work through a natural evolutionary process instead" (p. 14). The statement by Johnson that holds that evolution and religion are in conflict is also contradicted by the many religions in America that find no general conflict with Darwin's evolution and by the 40 percent of Americans who accept both evolution and belief in God (Gallup Poll, 1991).

Conclusion

In this paper we have proposed a brief procedure which will inform students about religious rapprochement with Darwinian evolution and the inherent unfairness of the two-model doctrine. We acknowledge that the trial of Darwin will continue as long as there are interpreters of Genesis who insist that a "day" to an all-powerful divinity must be twenty-four hours long. Clearly Johnson is not one of these since he declared that God "might have chosen to work through a natural evolutionary process instead" (1993:14). However, the trial of Darwin is over for those members of religious denominations who are informed of the view of evolution developed by their own religious organization. As stated earlier these include two Popes, six Protestant organizations and the Conference of American Rabbis. A central purpose of the questionnaire was to inform students of the diversity of these religious views. It is a misconception to refer to "the conflict between religion and evolution." In the United States it is a conflict between a few denominations and evolution. This brings us back to the second purpose of the questionnaire, which was to clarify that the two-model doctrine is intrinsically unfair because it ignores the views of other religions. Fairness requires taking classroom time to present several models, but that in turn is unfair to students who need that time to understand the nature of science and the science of nature.

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Appendix 1

Sources for Questions and Answers in the "Who Said It?" Survey

1. Catholic: Pope John Paul II: Address to the Pontifical Academy of Science, 1981 (Matsumura 1995:97).

2. Catholic: Pope Pius XII: Address to the Pontifical Academy of Science, 1939 (Frye 1983:199).

3. Lutheran World Federation: Encyclopedia of the Lutheran Church (Matsumura 1995:96).

4. United Presbyterian Church inthe U.S.A.: 195th General Assembly (Matsumura 1995: 113-114).

5. 67th General Convention of the Episcopal Church, 1982 (Matsumura 1995:92).

6. United Church Board for Homeland Ministries (Matsumura 1995:102).

7. Unitarian Universalist Association: 21st General Assembly, 1982 (Matsumura 1995:99).

8. United Methodist Church: Iowa National Conference, 1984 (Matsumura 1995:106).

9. Central Conference of American Rabbis: 95th Convention, 1984 (Matsumura 1995:88).

Correction: In the previous issue of *Creation/Evolution* we incorrectly reported the internet address of Lorence Collins's web site on polonium halos. Interested readers should point their browsers to **http://www.csun.edu/~vcgeo005** for a complete discussion of this topic. We regret any inconvenience this error has caused and thank Dr. Collins for bringing this to our attention.

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Naturalism, Creationism and the Meaning of Life: The Case of Phillip Johnson Revisited

Robert T. Pennock

Creationism's Crisis of Meaning

Listen carefully to creationists for long enough and you will realize that they are not so much worried about evolution as they are worried about meaninglessness. Most people are probably initially both amused and puzzled by creationism. We think that denying evolution is now on a par with the view that the earth is flat. It perplexes us how someone can ignore the clear evidence for evolution. We all know the ways that science has conflicted with the Bible in the past and how Christians have worked through these conflicts, and we wonder why creationists get so worked up about this particular scientific conclusion. I think we can better understand the situation if we look beyond the scientific and pseudo-scientific arguments and recognize that what underlies and fuels the issue is a deep philosophical and theological concern about loss of purpose. The creationism controversy is not just about trying to avoid being descended from apes, it is about trying to avoid an existential crisis.

Although there are theistic existentialists, it is the atheistic French existentialists, especially Jean-Paul Sartre and Albert Camus, who most keenly dramatized the bleak world view that leads to a crisis of meaning. They saw the universe as amoral and supremely indifferent to us and argued that human life had no essential value. Creationists do not want to believe that life is meaningless, but they seem to fear that it would be so if evolution is true. Often one must read between the lines to find this usually unarticulated fear, but many creationist writers have identified it and express it quite directly.

For example, John Ankerberg, who supports young-earth creationism in his widely broadcast television show, writes in one of his pamphlets: "In the evolutionary or materialistic world view, man has no unique status other than which he may choose to give himself" (Ankerberg and Weldon, 1993, p. 37). Hugh Ross, whose Reasons to Believe ministry defends an old-earth creationism, puts the point this way: "[I]f the universe is not created or is in some manner accidental, then it has no objective meaning, and consequently, life, including human life, has no meaning" (Ross, 1993, Ch. 1). Finally, Phillip Johnson, the Berkeley law professor who defends the minimal "intelligent design" creationism, attacks evolution by trying to undermine its naturalistic basis. He makes the worry most starkly explicit: "Scientific naturalism is a story that reduces reality to physical particles and impersonal laws, [and] portrays life as a meaningless competition among organisms that exist only to survive and reproduce" (Johnson, 1995, p. 197).

Almost all the debate between creationists and scientists has dealt with the scientific evidence for evolution, but this obscures the underlying concerns that have little to do with how we got here and everything to do with the philosophical and theological consequences of thinking that we got here one way rather than another. However, looking at these statements a philosopher sees the expression of existential angst—a gnawing anxiety that life is

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without value or meaning. This paper will explore the nature of the creationists' existential worries. I will refer to a variety of creationists to demonstrate the scope of this anxiety, but will take Phillip Johnson as my main case because he exhibits the concern most thoroughly. In particular, I will focus upon his most recent book *Reason in the Balance* (Johnson, 1995), in which he tries to express what is wrong with the naturalistic philosophy that he claims props up the evolutionary picture of the world and what is really at stake in the creationism debate. If we can understand these beliefs and how they lead to a fear of meaninglessness, perhaps we may be able find a way to assuage the crisis of values that drives the creationist crusade.

The "Evil Fruits" of Evolution

Phillip Johnson opens *Reason in the Balance* [RIB] with the following question and statement of intent:

> Is God the true creator of everything that exists, or is God a product of the human imagination, real only in the minds of those who believe? This book is about how people answer that question, and the consequences of answering it one way or another (RIB, p. 7).

The mention of God simply as the true creator tacitly signals an important difference between Johnson and other creationists, for he refuses to reveal his positive view about the details of Creation and officially advocates only the generic notion that God creates purposefully. Johnson first stepped up to challenge Darwinism in 1990 with a pamphlet *"Evolution as Dogma"* (Johnson, 1990) and quickly followed this with his book *"Darwin on Trial"* (Johnson, 1991). In these works and in his articles and public lectures, Johnson's strategy is to define evolution in opposition to this minimal notion of creationism and then to support the latter by negative argument against the former. His innovation is the argument that evolution wins only because science rules out the possibility of divine creation dogmatically by what he calls its speculative metaphysical doctrine of naturalism.

Johnson does not maintain a consistent notion of naturalism, but the central idea he has in mind is that it rules out by *fiat* any intervention by God in the physical world of cause and effects. In his main discussion of naturalism in *Reason in the Balance*, Johnson explains his notion of the concept as follows:

> 'Naturalism' is similar to 'materialism,' the doctrine that all reality has a material base....The essential point is that nature is understood by both naturalists and materialists to be 'all there is' and to be fundamentally mindless and purposeless (RIB, p. 38).

Johnson's central argument against evolution is that it rests upon a dogmatic speculative metaphysics and unfairly rules out the better theory—the creationist view that God designed the world for a purpose—because that metaphysics is essentially atheistic. For example, he writes:

> Naturalism is a *metaphysical* doctrine, which means simply that it states a par-

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> ticular view of what is ultimately real and unreal. According to naturalism, what is ultimately real is nature, which consists of the fundamental particles that make up what we call matter and energy, together with the natural laws that govern how those particles behave. Nature itself is ultimately all there is, at least as far as we are concerned. To put it another way, nature is a permanently closed system of material causes and effects that can never be influenced by anything outside of itself—by God, for example. To speak of something as 'supernatural' is therefore to imply that it is imaginary, and belief in powerful imaginary entities is known as superstition (RIB, p. 38).

I have criticized Johnson's discussion of naturalism elsewhere (Pennock, 1996a; Pennock, 1996b). That discussion is not repeated here because the goal of this paper is to inquire about what worries lie behind it. The first quote points us towards the answer. Johnson sees the creationist controversy as a weighing of two incompatible metaphysical/moral world views. In our right hand is the generic creationist view in which the world and human beings were designed by God with a purpose in mind, and in our left hand is the view of evolutionary naturalism in which we are the result of "a purposeless material process" (RIB, p. 14) and God is merely an idea in our minds. Weigh these two world views carefully, warns Johnson, for the consequences of choosing incorrectly are dire indeed.

Johnson is not alone in seeing the creationism debate as fundamentally about the consequences of two opposing moral world views. A recent posting on the Christian Answers page on the World Wide Web describing what is at stake in the creation/evolution debate mentions several supposed consequences of Darwinism upon society and ethics:

> [E]volution has given a scientific justification for rejecting the absolutes of God's Word in Western society....Increasing lawlessness (no one owns me, there are no rules); abortion (we're all just animals anyway); marriage breakdown (Jesus' teaching on marriage and divorce always went back to the historical basis in Genesis) and ever more open homosexual practices are just some of the fruits being reaped by a society rearing its young in this anti-biblical world view (Anonymous, 1996).

The writer highlights the atrocities of Nazi Germany as the "starkest example" of "openly admitted application of consistent evolutionary thinking" (Anonymous, 1996). Such outrageous statements about the supposed consequences of evolution are not uncommon, as I discovered during a recent visit to the Museum of Creation and Earth History in Santee, California, run by the Institute for Creation Research (ICR). The exhibit, which attacks "evolutionism" and promotes the young-earth creationist view, concludes with two panels that depict the "fruits" of the two world views.

On one panel we find a list of the good fruits of creationism:

True Christology	True Faith	True Family Life
True Evangelism	True Morality	True Education
True Missions	True Hope	True History
True Fellowship	True Americanism	True Science
True Gospel	True Government	

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On the other panel we see the purported evil fruits of evolutionism:

Communism	Racism	Abortion
Nazism	Pantheism	Euthanasia
Imperialism	Behaviorism	Chauvinism
Monopolism	Materialism	Infanticide
Humanism	Promiscuity	Homosexuality
Atheism	Pornography	Child Abuse
Scientism	Genocide	Bestiality
	Slavery	Drug Culture

The viewer is asked to choose between the creationist world view and that which opposes it.

Although Johnson is subtler and more indirect, he too implicates the world view of evolutionary naturalism and its handmaiden liberal rationalism in many of these same items including, for example, abortion (RIB, p. 41), homosexuality (RIB, p. 22), pornography (RIB, p. 41), divorce (RIB, p. 41), genocide (RIB, p. 144), and even bestiality (RIB, p. 141). As we shall see, he blames the world view of this unholy duo—the combination he terms "modernist naturalism" (RIB, p. 45)—for other evils besides, including "the irrationalist and tribalist reaction that is so visible all around us" (RIB, p. 197).

Could it really be that Darwin begot all this? It would take more space than we have here, but it would be fairly easy to go through these lists and refute each charge in turn. However, one example should suffice. The evil of slavery was perpetrated long before the theory of evolution ever arose. Certainly evolutionary theory itself does not justify slavery, and Darwin himself was an adamant abolitionist who wrote "How weak are the arguments of those who maintain that slavery is a tolerable evil!" (Quoted in Desmond and Moore 1991, p. 122). Sadly, among the most common pro-slavery arguments were ones made by Christians who quoted Leviticus (25:44-46), I Timothy (6:1) and a variety of other scriptural passages to show that slavery was endorsed by the Bible. Indeed, creationists should know that it was common to cite Genesis (9:27), in which the righteous Noah curses his son Ham and his descendants to be slaves, as the "creation story" of slavery.

However, we should not let the offensiveness and absurdity of the implications distract us. The important point is to recognize that creationists believe Darwinism and its world view lead to such consequences. Now we can go on to try to discover why.

Johnson on the Modernist Naturalist World View

For Phillip Johnson, the world view that he opposes includes not only an array of social evils, but a bevy of philosophical views, such as Rortian neopragmatism (RIB, p. 116), hermeneutics (RIB, p. 112), ethical relativism (RIB, p. 17), liberal rationalism (RIB, p. 40), post-modernism (RIB, p. 112), and reductive materialism (RIB, p. 126), that he thinks give rise to those evils. Biologists who have evaluated Johnson's critique of evolutionary theory often express irritation with Johnson in that it is so clear that he lacks the biologist's understanding of the material (Provine, 1990). Similarly, a philosopher finds it frustrating to read Johnson's work, not only because he ignores distinctions we find critical, thereby conflating quite distinct conceptual positions, but also because he regularly uses terms in non-standard and inconsistent ways that lead him to make unjustified conceptual leaps. He also has the lawyerly habit of making every issue into a winner-take-all choice between two positions.

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In *Darwin on Trial* the parties in the case were specially defined versions of creationism and evolution, but in *Reason in the Balance* we see that the disputants each have several aliases. Johnson now identifies his client as theistic realism—the view that "God is objectively real" (RIB, p. 49)—and on its behalf he brings suit against modernist naturalism. These are the supposedly contradictory viewpoints in the metaphysical dispute that Johnson had announced in his opening question. One of the greatest dangers of creationism is the way that it, like other extremist views, polarizes debate and, drawing a line in the dust, asks "Are you with us or against us? Be ye friend or be ye foe?" If we are to defuse tensions in the creationist controversy we must try to get past such posturing. One way to do this will be for us to call attention to the ways in which Johnson and other creationists construct this and other false dichotomies and draw misleading inferences from them, and to reject them forthrightly and explicitly.

Ethical Relativism, Sex and Authority

Johnson locates the roots of the modernist world view in the "liberal rationalism" of 17th- and 18th-century philosophers such as Thomas Hobbes, John Locke, David Hume, Adam Smith and John Stuart Mill. As Johnson uses this term, "Its essence lies in a respect for the autonomy of the individual" (RIB, p. 40). He goes on to explain that, although the founders of liberalism were theists, contemporary liberalism "incorporates the naturalistic doctrine that God is unreal, a product of the human imagination" (RIB, p. 40). On this combined modernist naturalist view there are natural rights that derive from our status as autonomous beings, but, says Johnson, there are typically no natural obligations, particularly none from God, since God is an illusion. The only legitimate obligations are those that individuals consent to be bound by, in the same way that the only legitimate government is one that has the consent of the governed. Johnson concludes that because of this basis in individual rights and autonomy, modernist morality becomes "permissive" and "relativistic" (RIB, p. 41). Elsewhere he makes the point this way:

> From a modernist standpoint, morality is subjective. Some people may have the opinion that certain conduct is immoral, but others have an equal right to disagree (RIB, p. 139).

We must challenge such mis-statements and non-sequiturs.

First of all, the modernist philosophers Johnson cites as the progenitors of liberalism certainly did not think of morality as relativistic or subjective, nor do the vast majority of philosophers today. Relativism certainly does not follow from respect for individuals' autonomy, for that simply holds that individuals are responsible for their own moral choices and actions, and this view is equally at the heart of any religious morality that appeals to a person's conscience. Indeed, the notion of autonomy is most closely associated with the philosophy of Immanual Kant, who is a theistic liberal rationalist on Johnson's definition, but has as radically anti-subjectivist and anti-relativist an ethical system as one can imagine. According to Kantian ethics rational autonomous agents are able to discover the moral rules that fix their ethical duties by careful application of reason, and these moral imperatives hold universally and absolutely (no person is exempt from the rules and the rules have no exceptions).

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If anything, even without the theistic element, respect for individual moral autonomy more clearly generates rather than removes obligations. Similarly, to say that people have a right to disagree about their moral opinions is not to say that morality is subjective but rather to state a political right that persons may not force their own moral opinion upon others. As for whether liberal rationalism is "permissive," that judgment depends upon how much one thinks should be forbidden or restricted.

Johnson seems to think that modernist naturalism does not forbid nearly enough and that is the cause of the social evils we see. Continuing from the previous quote, Johnson writes:

> The term morality in modernist usage is usually associated with sexual morality, and therefore with traditional prohibitions of sodomy, fornication, adultery and abortion. With respect to such matters involving personal taste and one's own body, consenting adults must be free to do as they like (RIB, p. 139).

Given that Johnson opposes modernism, the clear implication here and elsewhere is that people should not be free to choose in such matters.

This may seem to be taking us rather far afield from the issue of creationism, but Johnson tells us that in debates with evolutionists the topic invariably turns to sexual politics. I can only think this is because creationists like Johnson regularly argue that such matters are at stake. If I were a Freudian rather than a philosopher, I might have argued that it is not meaninglessness, but sex, that is the real worry of creationists. Even without an evolutionist to bring up the matter, in *Reason in the Balance* Johnson introduces issues of sexual morality in every chapter. The majority of his examples of the purported conflict between theistic and naturalistic world views involve sex: chastity versus premarital sex; faithful, stable marriages versus adultery and divorce; heterosexual versus homosexual relationships; flexible gender roles versus proper roles of male and female. He *twice* tells us that modernism has led to sex-education classes in which girls practice unrolling condoms over cucumbers (RIB, p. 22, 161).

It is probably true that the person-on-the-street associates morality with prohibitions regarding sexual behavior, because these are likely to have been foremost among the moral rules that one is taught as an adolescent. What is surprising and quite incorrect is Johnson's statement that modernist philosophy usually makes this association. Issues of sexual morality form a small subset of the topics that ethicists consider. To take as examples a few of the modern philosophers Johnson mentioned, Hobbes's main concerns involved political rights and obligations and the justification for government; Smith wrote mostly about economic liberty; and Mill's main concern was how a government could form ethical public policies that avoided the irresolvable deadlock of differing religious viewpoints, each of which appealed to revealed Truth.

On the other hand, Johnson's emphasis upon sexual morality is not surprising since this is among the main moral concerns of the Religious Right, and it is here that we find most creationists. What is the connection? It is their idea that knowledge of morality and of the world has its source in the authority of the Bible, rather than in some other way, and that each depends upon the other. Here again we see the sharp delineation of the world views:

> The rationality of any moral code...is linked to a picture of reality that contains both fact and value elements....The Christian story is one of human beings who are created by God, but who are separated from God by their own sin and must be

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> saved from that sin to become what they were meant to be. The Enlightenment rationalist story is one of human beings who escape from superstition by mastering scientific knowledge and eventually realize that their ancestors created God rather than the other way around (RIB, p. 32).

According to Johnson, modern society has wrongly abandoned belief in the Bible as authoritative. He complains that modernists hold that God is dead and thereby reject the Christian's appeal to the authority of the Creator as being irrational. Johnson wants to resurrect the legitimacy of appeal to Biblical authority. Later we will see what is wrong with Johnson's analysis of modernist naturalism and its relation to God and morality; for the moment let us briefly examine how he applies his analysis to the cases of education and, his specialty, the law.

Johnson devotes a long section of *Reason in the Balance* to criticizing Yale law school professor Bruce Ackerman's defense of liberal rationalism in *Social Justice in the Liberal State*. He especially decries Ackerman's application of this anti-authoritarian philosophy in education, in which "[t]he goal is to produce self-defining adults who choose their own values and life-styles from among a host of alternatives, rather than obedient children who follow a particular course laid down for them by their elders" (RIB, p. 157). Johnson wants a return to an authoritarian education that teaches children to be what their parents wish them to be, whether that be a priest or businessman for Jack or a mother and homemaker for Jill (RIB, p. 157). What are the effects of abandoning the authority model in education? A society in which Johnny cannot tell right from wrong. And what if Bible-believing parents in some school district want to have their children learn arguments against evolution or to be taught to save sex for marriage? Johnson says that modernists in the media will ridicule them as irrational religious extremists and that the educational bureaucracies will see that "rationality" prevails. Furthermore, the court system will back this up.

For much of the past in the West, "lawmakers assumed that authoritative moral guidance was available to them in the Bible" (RIB, p. 39), but the legal system, too, is now infected with modernist naturalism. According to the standards of naturalist rationality that it assumes, says Johnson, adultery may be wrong because it is a breach of contract or because of the damage it causes to human relationships, but since the Creator God of the Bible is as unreal as Zeus, "to condemn adultery merely because God forbids it would be, in modernist terms, irrational" (RIB, p. 39). Johnson's view is the opposite—that adultery and other sexual immoralities are immoral merely because God forbids them and that it is rational to believe so and proper to set public law upon this base.

And what are the "fact elements" of the picture of reality mentioned in the previous long quote that supports the rationality of this moral code? They are the traditional creationist theses that human beings are not the product of evolution by natural selection but rather were specially designed and created by God for some divine purpose. For the creationist, the fact and value elements of the creation story are inseparably linked. For instance, that Genesis reveals that God purposely created us "male and female" is critical for understanding that men and women should have different moral roles. Creationists hold that the Bible is authoritative on all such issues. Johnson recommends that the law reflect these fundamental truths and suggests that the Supreme Court erred in its rulings against teaching creationism in the public schools.

> If a high-school curriculum incorporates the subject of biological origins, and if supernatural creation is a rational alternative to naturalistic evolution within that

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> subject, then it is bad educational policy as well as viewpoint discrimination to try to keep students ignorant of an alternative that may be true (RIB, p. 26).

The last part of this quote, to the effect that divine Creation may be true, takes us to the next major element of their concern.

The Desire for Absolute Truth

As we saw in ICR's list of the good fruits of creationism, all of them are "true." Johnson thinks that defenders of evolution try to avoid talking about truth. He thinks creationists know the truth about biological origins and that evolutionists set up "rules of science" that exclude creationism specifically to suppress that truth. Evolution appears to win only because the scientific priesthood stands guard at the door to defend its dogma. Johnson devotes a full chapter to a discussion of truth, taking the work of two major philosophers, Richard Rorty and John Searle, as exemplars, respectively, of the pragmatist and "traditionalist" views of truth, and he tries to show that both are infected by naturalism. He wants creationism to be considered as a candidate for absolute truth and claims that this concept does not even make sense in the non-theistic framework of naturalism.

> This emphasis on truth as an absolute seems almost quaint in an era dominated by naturalism and hence by pragmatism. Pragmatism is less concerned with what is absolutely true than with what is useful for some specific professional agenda (the scientific outlook) or for some worthy social program (empowering the victims, saving the environment). The very idea of absolute truth, independent of and superior to the consensus of opinion among the most educated people, is fundamentally a theistic concept that makes little sense in terms of modernist metaphysics (RIB, p. 196).

This remarkable set of statements is the most important passage in Johnson's discussion of truth, and it would take several pages to enumerate and explain the half-dozen ways in which it is seriously mistaken or misleading. Because in this paper I am only interested in these issues as they bear upon the problem of meaning and value, I will just briefly mention a few of them here.

First of all, it is not clear what Johnson means by "absolute truth." One standard meaning of "absolute" in this context is to express a contrast with *relativism.* Johnson does claim that relativism is one of the bad consequences of modernism, but if that is his intended meaning, then opposition to relativism is certainly not antithetical to science and may be found among many naturalists and even among some forms of pragmatism. Another possible, though less common, meaning of "absolute truth" is that it refers to *degree of certainty*, so to claim absolute truth is to claim *absolute certainty.* If this is Johnson's intended meaning, then it is fair to say the idea is quaint, for at least in science one is rarely in a position to claim complete certainty in the truth of scientific conclusions. In science one typically makes only some probabilistic assessment of the degree of warranted belief (perhaps expressed in terms of a statistical significance level) in the truth of a conclusion, and even such assessments are taken to be revisable in principle should countervailing evidence be found. Finally, one might take "absolute truth" to indicate *absolute precision.* If this is

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Johnson's intended meaning, then he is correct because scientific claims of truth are almost always to be understood in terms of approximation. That is, when scientists claim that a law is true what they mean is not that it is perfectly precise, but that it is accurate to within some stated limits of tolerance. However, being careful and explicit about margins of error and not claiming absolute precision is one of the strengths of science. Thus, if Johnson demands absolute truth in the first sense (i.e., of being contrasted with relativism) then it is not "quaint" let alone incompatible with naturalism. If he means it in the second or third sense, then absolute truth *is* now disavowed by science and, I think we should agree, quite properly so.

Secondly, Johnson's characterization of pragmatism that specifies utility in terms of "professional agenda" or "worthy social program" is incomplete and seriously misleading. A much more common pragmatic notion of utility might be couched in terms of usefulness for "getting around safely in the world," and this hardly has the ideological baggage that Johnson's examples suggest.

Thirdly, it is not true that pragmatism is a logical consequence of naturalism, unless the majority of naturalists are fools, for one may find almost every type of theory of truth among naturalists. It is also wrong to describe pragmatism in terms of "the consensus of opinion among the most educated people," which falsely suggests not only that the pragmatic notion of truth simply deals with combining opinions but also that it involves a kind of academic elitism. The last claims that absolute truth is "fundamentally a theistic concept" and that it "makes little sense in terms of modernist metaphysics" are also wide of the mark. In many of these cases, perhaps because he takes Rorty as his example, Johnson winds up attributing to modernism points of view that are closer to post-modernism.

As the name suggests, post-modernism is a more recent philosophical view that is a reaction against modernism. It typically rejects the modernist ideas of rationality, objective knowledge and mind-independent reality, holding instead that reality is "constructed" rather than rationally discovered and that what we call "knowledge" is nothing more than the specific constructed fiction that those in power are able to enforce. In the post-modernist view, science has no special privilege to interpret the world, and its high status derives from the cultural-political power of its practitioners. Given that post-modernism is almost as opposed to the scientific world view as Johnson is, it is particularly unfair that he conflates them as he does.

Although Rorty is certainly the most important representative of one influential form of the new pragmatism, his is hardly the only version of that theory of truth. Furthermore, pragmatism is not necessarily the enemy of theism. Indeed, the generic notion of pragmatism—interpreting truth in terms of the test of what "works" (that is, in terms of outcomes)—allows a range of possible specific alternatives, many of which are compatible with or even support some forms of theism. For instance, there is an element of pragmatism in the most common Christian test of truth: By their fruits ye shall know them. (Remember it was this very test that evolutionism supposedly fails.) In this advice Jesus was explaining that one can distinguish true Christians and true Christian doctrines from false ones by seeing whether or not they work to produce, say, a loving community, a heavenly kingdom on earth. Because Johnson wants to blame naturalism for all that is bad, he paints a greatly over-simplified picture of the philosophical landscape.

We see this again in his discussion of Searle, who represents the "traditionalists," who holds to a correspondence view of truth. On this view a statement is true if it reflects what is so in the world. Although Johnson does note that this notion of truth includes the ideas of objectivity and reality that he likes, he immediately attacks Searle's view, which he characterizes as being essentially tied to reductive materialism. It appears that Johnson finds re-

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ductionism unacceptable because it makes the human mind into nothing more than a form of the physical and rules out the possibility of dualism and vitalism. These views say, respectively, that mental activity and life processes involve special substances that are ontologically distinct from physical matter and energy, and that they thereby stand outside the laws of physics and chemistry.

Johnson's conflation of Searle's "traditional" notion of truth to reductionism is another case of his oversimplified philosophical discussion, for Searle is perhaps most known for his work opposing simple reductionist accounts of the mental (Searle, 1990). As in other cases, Johnson ignores a wide range of intermediate viewpoints and presents a stark dichotomy. Explaining the reductionist, evolutionary, naturalist viewpoint to his fellow creationists he writes:

> You may think that humans are created in the image of an omniscient God, magnificently endowed with minds that fall far short of their potential because they are flawed by sin, but what we really are is baboons with surplus neurons that caused us to imagine God before science gave us knowledge (RIB, p. 128).

Setting the simplistic dichotomy aside, we may agree that Johnson is correct to say that science thinks of dualism and vitalism, at least in their naive forms, in much the same way that it thinks of creationism. However, this should help make it clear why his general charge that science is dogmatically atheistic is unjustified. Science does not impose a special rule to prohibit using God as an explanatory hypothesis specifically to exclude creationism or because of a general prejudice against religion or theism. Rather, science rejects all special ontological substances that are supernatural, and it does so without prejudice, be they mental or vital or divine.

These points about the nature of truth and of mind deserve greater attention, but they are relevant to the main topic in this paper only insofar as they play a role in the central problems of value and meaningfulness and the way these figure in the creationists' concerns, so I set them aside here and return to the main discussion.

Is Evolution to Blame for the Loss of Values?

To say that life is meaningful is, in part, to say that our lives are valuable. The fear of meaninglessness arises out of a fear of loss of values. Although we may disagree about some of them, we have seen that Johnson and other creationists do believe that the values they hold dear are at risk. But what does this have to do with evolution? Creationists believe that evolution is to blame. Johnson thinks that most other people deceive themselves into believing otherwise or else just try to ignore the issue, but that everyone who has thought about it understands, for example, the conflict between evolution and morality. Discussing the influential 1897 lecture "The Path of the Law" by Supreme Court Justice Oliver Wendell Holmes, Johnson writes: "As a convinced Darwinist who profoundly understood the philosophical implications of Darwinism, Holmes found it difficult to take morality seriously" (RIB, p. 143). The philosopher of biology winces to read such glib statements about the relation of evolution and ethics.

I cannot say whether or why Holmes drew this faulty inference, but it is easy to locate Johnson's error. Johnson holds that the basis for law, education, philosophy and morality lies is a culture's creation story: "If we want to know how we ought to lead our lives and relate to our fellow creatures, the place to begin is with knowledge about how and why we

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came into existence" (RIB, p. 12). Johnson does not say enough about how knowledge of our origins is supposed to help us know how we ought to live our lives to allow me to evaluate fully his position, but, on the surface at least, it appears that his view commits either the genetic fallacy or the naturalistic fallacy or both.

Darwinian evolution, Johnson says, matters only secondarily as science; its primary importance is that it has become the West's dominant creation story. On this view of the ground of values, it is no wonder that law, education, philosophy and morality are in crisis, if they are based upon an inherently meaningless creation myth. Johnson reiterates this point: "[The] naturalistic creation story implies that knowledge of the Creator's mind and purpose is inherently illusory; the true creator—evolution—has no mind or purpose" (RIB, p. 13). This takes us full circle to the problem with which we began.

The critical issue for the creationist is not really about the truth or falsity of evolution as a descriptive and explanatory scientific theory, or even about the validity of "creation-science" as a scientific alternative, but rather about their relative viability and worth as value-grounding creation stories. Creationism tells of a world that God planned with us in mind in which we have special roles to play that, properly understood and followed, will fill our lives with meaning. "Evolutionism" tells of a godless, material world in which we are the accidental result of meaningless mechanical processes that no more had us in mind than aphids or fly larvae. Creationists fear that if evolution is true then the only basis for value, the only source of purpose, the only foundation for meaningfulness would be lost. We may see this expressed by other creationists as well, such as Fred Heeren:

> If our universe came about by some strange fluke and there is nothing outside of it, no purposeful Creator beyond its time and space to value it or give it meaning, then it must remain without meaning. The universe can't generate its own meaning or value any more than a rare rock sitting on an uninhabited planet can ever be valuable sitting there all by itself (Heeren, 1995, p. 230).

Hugh Ross, the old-earth creationist, says much the same thing of the evolutionary world view:

> A mechanical chain of events determines everything. Morality and religion may be temporarily useful but are ultimately irrelevant. On the other hand, if the universe is created, then there must be reality beyond the confines of the universe. The Creator is that ultimate reality and wields authority over all else. The Creator is the source of life and establishes its meaning and purpose. The Creator's character defines morality (Ross, 1993, Ch. 1).

This notion that the Creator's authority alone grounds morality—indeed, that this is the only possible ground for meaning—is the important assumption that underlies and drives the creationist existential worry. We have already seen how it runs through Johnson's book. Students should follow the authority of their teachers who will mold and shape them. Children should obey the authority of their parents who brought them into the world. We, as children and creations of God, should follow God's authority. Being moral involves recognizing and obeying our Lord's commandments. According to this view, morality, value and meaning are necessarily based on the authority of the Creator who brought us into being with a purpose in mind.

For Johnson this idea is so central that it becomes part of his very definition of what it

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is to be a theist. He writes: "*[T]heists*...believe...that we were created by God, a supernatural being who cares about what we do and has a purpose for our lives which is to be fulfilled in eternity" (RIB, p. 7). Given this understanding of the source of purpose it is easier to see why creationists believe that evolution threatens meaningfulness. The deep connection between God and value comes out clearly in another passage in which Johnson says: "In fact, one way to define theism is that it is a story about the universe that proclaims the reality of the true, the good and the beautiful" (RIB, p. 197).

If being an evolutionist meant rejecting truth, goodness and beauty, then who would not want to be on the side of the angels? However, this idiosyncratic notion of theism is just another example of Johnson's creative redefinitions, and, in any case, neither evolution nor scientific naturalism is in any way contrary to truth, goodness, or beauty. More to the point, neither is either one incompatible with the existence of God, though Johnson, in his effort to paint the world in the black-and-white terms of his two world views, would have us believe otherwise.

As do other creationists, Johnson dismisses one after another alternative or compromise position and chides Christians who defend evolution or who believe that religion can be reconciled with scientific naturalism. He calls such theologians "theistic naturalists" (RIB, pp. 97, 211). Since, in Johnson's definition, naturalism denies God, the notion of a theistic naturalism is a contradiction in terms, and Johnson's implication is that such Christians hold a logically absurd view and delude themselves in believing otherwise. Johnson rejects such attempts to chart out a course of reconciliation as "accommodation" to scientific naturalism (RIB, p. 97).

In his earlier works Johnson tried to appear to defend only the ecumenical notion of creationism as the view that God creates for a purpose, but that apparent tolerance quickly evaporates whenever he needs to draw the line more clearly between the two world views. Values and meaning rest upon matters of fact, in particular the truth-status of specific claims about Creation. He puts the matter most starkly in two passages:

> If...the universe was created by God for a purpose, the truth claims of Jesus Christ may well be credible and meaningful. Those claims are not even conceivably credible or meaningful if the universe is a meaningless chain of material causes (RIB, p. 194).
>
> Christianity makes sense only if its factual premises are true and if it is providing meaningful answers to questions that people ought to be asking. The essential factual premise is that God created us for a purpose, and our destiny is a glorious one in eternity (RIB, p. 204).

We already saw how Johnson claims that scientific naturalism leads to atheism and ethical chaos, erodes family values and the dignity of the human mind, and undercuts the basis of law and moral education. In the two passages above Johnson raises the stakes to even more incredible heights. Is accepting scientific naturalism really tantamount to calling Jesus a liar? Must Christianity itself topple if evolution is true? Does the hope of eternal life disappear with Darwinism?

Calming the Creationists' Fears

The purpose of this paper is not to respond in turn to the many specific allegations and

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fears that Johnson raises, but rather to address the underlying general malaise. Johnson is only standing in here to represent the worries of a wide range of creationists because he has articulated those worries most systematically. Our general goal was to see what creationists believe to be at stake in the debate and why, and then to try to alleviate the dread that their view engenders. Having identified the creationists' existential crisis of meaning and traced it to its source, we can now better understand why they are so fearful of evolution, and how their leaders' divisive rhetoric is likely to play upon these anxieties in others. Let us now focus upon how we might relieve such anxieties. There are several ways we may try to do this.

We may offer reassurance indirectly by continuing to identify errors in the creationist leaders' arguments about the relationship among evolution, naturalism, morality and meaning. In this article I have highlighted several faulty assumptions, imprecise concepts, ambiguous definitions and fallacious inferences in Johnson's recent writing, but much more could be done to show why his two-world-view dilemma is vastly over-simplified and that theists need not accept the either-or predicament he tries to set up. However, we should not resort to a merely negative campaign and should try to offer some positive reassurance as well. Here I recommend we try two approaches. First we should point out that the possibility of moral values does not depend upon the authority of God, so a meaningful, value-filled life would be possible even if evolutionary naturalism did imply the "death of God." Second, and most important to reassure the troubled theist, we can show that evolution does not imply that God does not exist and that scientific naturalism is not equivalent to atheism.

Meaning Independent of God

Starting with the first point, let us reconsider the worry that if there is no God then life would be meaningless. As we have seen, creationists believe that value, morality, purpose and meaning necessarily depend solely upon God's authority or commandment. But why should we assume this?

Beginning with a few simple psychological observations, we may note that the world is full of people who do not believe in God and yet find their lives to be meaningful. The creationists' notion of a personal God as described in Genesis who created us for a specific purpose is a common but a minority spiritual view. It would seem very odd to claim that people who do not share the creationists' notion are simply wrong when they report that their lives are valuable and fulfilling. That a creationist would find life meaningless if the God of Genesis is undermined by evolution tells us more about creationists than it does about meaningfulness.

Ask people what is most valuable in their lives, what gives their lives meaning, and you will get a wide range of answers. Certainly some people will cite their faith in God (though for most of these their faith does not depend upon whether or not the Genesis account is literally true). Many more will mention the pride and joy they feel for their children, the tenderness they feel for their lovers and friends, the sense of accomplishment they derive from their work, the pleasure they receive from music and art, or the deep satisfaction they feel in the struggle to build a better tomorrow. People find value in a well-crafted novel and a well-cooked meal, in vigorous athletic activity and in quiet moments of reflective contemplation. They find purpose in the building of a home, the furtherance of social justice, and the pursuit of scientific knowledge. How easy it is to extend such a list! Thus, the creationists' fear that life would be devoid of meaning without belief in God seems ill-founded—value and purpose, at least in the straightforward felt psychological

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sense, may be found at every turn.

But what if we expect more? Suppose that one wants not just the feeling of value but values that are justified. A creationist might rightly complain that psychology cannot supply more than a subjective, individual notion of value and meaning. On this point the philosopher and the creationist can agree: by itself the simple identification of individual psychological value does nothing to justify those values. We would not want to fall into a form of subjective ethical relativism, which is antithetical to the most basic meaning of morality. But now the creationist and the philosopher once again part ways, for the former holds, as we saw, that only God's authority can justify morality and value. There are two parts to the philosopher's disagreement here.

The first is to note that rejecting relativism is only the first step in ethics, usually accomplished in the first week of one's introductory philosophy class, and that it is at this point that the positive work of moral philosophy begins. We need not leave the values mentioned above behind as merely psychological, for there is a whole history of ethical thought that is available to justify their worth. There is a wealth of substantive work that has been done in ethical theory that supports objective moral values, but one solution to the existential crisis is offered by Existentialism itself. I mention this not because I think it is the best approach, but because the Existentialist accepts the creationists' worst fears about purposelessness and the subjectivity of values and yet finds a way to continue forward.

According to the Existentialist, we are right to feel worried about meaninglessness because the world really is meaningless. We are moral beings in an amoral world, so it is quite understandable that, thrown into such an absurd situation, we might wonder whether life is worth living. Nevertheless, let us not give in to despair, counsels the Existentialist, for as moral beings we have the freedom to interpret the world as we will and thereby to impart meaning to life. If we are not given a purpose, we can generate our own purposes. We can thumb our noses at meaninglessness and rise above the amoral contingencies of the world, creating value as we go, by the choices we make and the actions we take. This is a philosophy that challenges us to be masters of our own fate and to carry on in the face of hopelessness. Think of Don Quixote as the existentialist hero who conjures a world of knightly responsibility and honor. That he tilts only at windmills, rather than true giants, does not take away from the valor of his deed or his courage of character. That his Dulcinea is no true lady does not diminish her value to him or the true chaste love he feels for her in his heart.

The second point of disagreement is stronger: God's authority cannot serve as a ground to justify morality and value. This may seem paradoxical or even arrogantly irreverent at first, but it is in fact neither and is a widely acknowledged point among both philosophers and theologians. The classical version of the argument comes from Plato, who makes the point in the *Euthyphro* (Hamilton and Cairns, 1961, pp. 169-185) with a simple but profound question, here put in contemporary language: "Is something good because God commands it so, or does God command it because it is indeed good?"

Let us suppose the first to be the case—Johnson's and the creationists' view—that moral value comes only from God's authoritative word, that moral value is *by definition* that which God commands. If so, then if God commands us to love one another, then loving one another is morally good, by definition. However, it is equally true on this view that if God were instead to command us to hate and enslave all those who are of a different race then, still by definition, the hate-filled slave-holder would be morally good and praiseworthy. Similarly, if God were to have created us such that our purpose was to kill each other for fun, then the peacemaker would be a demon and the serial murderer would be a moral saint, again by definition. Surely such conclusions about morality are crazy. Indeed, the

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creationist will likely say that such ideas move beyond irreverence into blasphemy and that it is impossible to think that God would ever command such immoralities. However, notice that such a reply would be a self-contradiction for someone who says that morality is merely that which God commands.

Johnson and the other creationists cannot truly be serious that morality is simply what God commands or that our purpose is just whatever God chose for us in Creation. Given their other beliefs, it must be simply a mistake that they proclaim this view. We may put the point another way. If we hold the creationists' view consistently, then such claims as "God is good" or "God is omni-benevolent" would be reduced to vacuous trivialities instead of being important statements with content about the character of the Creator. Again, we know creationists cannot seriously believe this. Plato's point is that this view that God's authority as the origin of value is fundamentally flawed. It is rather the second view that makes more sense, namely that God commands something because it is indeed good. That means, therefore, that goodness must have a basis that is independent of God. The lesson for us is here is that the creationist version of the existentialist fear is ill-founded—the possibility of value, purpose and meaning is not lost even if God does not exist.

Evolution does not imply atheism

Plato's *Euthyphro* argument showed us that the authority of God *per se* does not provide a ground for morality—loving one's neighbor is not good simply because God commands it, rather God commands it because it is good. Morality could thus have an objective ground whether or not there is a God. Therefore, even if evolution implies "the death of God" it would not imply the end of objective values. An atheist who thought that atheism obviates moral responsibility would be making the same mistake the creationist makes. However, as a worst-case scenario let us now consider the creationist who is not satisfied with objective values but holds that God's existence itself is essential for a meaningful life in some other way, perhaps to guarantee an eternal afterlife. Can we assuage this fear? We can, because evolution does not preclude the existence of God.

Creationist activists often note that Darwin lost his belief in God after he came to the evolutionary viewpoint. They speak of Joseph Stalin who had been a theology student but who, they say, read Darwin and because of that became an atheist and led the communist purges, slaughtering thousands of Russians. They mention prominent contemporary biologists who they say are atheists. Darwin's biographers do not think that his loss of faith is so simply attributable to his discovery of evolution (Desmond and Moore, 1991), and I doubt that we can blame evolutionism for all of Stalin's atrocities, but creationists are no doubt right that some biologists are atheists, and it is probably true that some may have become atheists because they thought that Darwinism led to atheism. However, all this is irrelevant. The only relevant question is whether Darwinism actually does imply that there is no God. Just as we should not condemn Christian morality in general simply because some people in the Church have committed horrible crimes in the name of Christ, so we should not condemn evolutionary theory simply because some people have illegitimately leapt to conclusions about the death of God from it.

What does evolution imply about the existence or non-existence of God? To answer this question let us quickly review the central elements of evolutionary theory. The first is the basic general fact that populations of organisms change over time in such a manner that new species arise from modifications of their ancestors. A second element is that the pace of this change is more or less gradual, though the rate may not be regular. A third element

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involves the reconstruction of the pathway of evolution, the ancestor-descendant relationships among species that form the tree of life. A fourth element is the mechanism (or more properly, mechanisms) of evolution, especially the Darwinian mechanism that involves the non-random natural selection of randomly generated heritable variations. Nowhere in evolutionary theory does it say that God does not exist, for the simple reason that, like cell theory and relativity theory and quantum theory and every other scientific theory, it says nothing at all about God. But to say nothing about God is not to say that God is nothing.

Evolutionary theory is naturalistic in just the same way that all scientific theories are, in that they proceed without any appeal to any supernatural entities or powers. Given that this is true of science generally, why should evolution be any special worry to the theist? If it is science's naturalistic methodology that is inherently problematic, then Johnson should be equally worried about chemistry and meteorology and electrical engineering. He should also be concerned about automobile mechanics, for this field too proceeds under the naturalistic assumption that God does not intervene in the workings of the engine. But surely no one thinks that these naturalistic sciences imply that God does not exist.

One conclusion about God that we may draw from evolutionary theory is that God is not necessary to explain the modification of species one into another or the adaptedness of organisms to their environment. Some might think this a threat to theism in that it undermines one positive argument for the existence of God. One version of what philosophers call the *teleological argument* tries to prove the existence of God by saying God is necessary to explain the apparently designed character of creatures and the fit of organisms to their environments. The most famous example of this sort of argument, that which Darwin had read and appreciated as a student, is William Paley's classic argument that, as we infer from the complexity of a pocketwatch the existence of a watchmaker, so we may infer from the even more intricate complexity of the world the existence of a divine world-maker.

Philosophers had already found the faults in this version of the teleological argument well before Darwin's theory arrived on the scene, but evolutionary theory put the final nail in its coffin by showing in a clear and simple way that God is not needed to explain the biological world since the evidence points to a natural process that accomplishes the same results. Johnson focuses on just this point, claiming that the whole issue rides on whether the Darwinian mechanism really can function, in Richard Dawkins's words, as a "blind watchmaker." He gives the impression that if the evolutionary mechanism is the true explanation of biological phenomena—what he calls "the blind watchmaker thesis"—then everything is lost.

Now it is true that, if someone thought that the biological version of the teleological argument was the only reason to believe in the existence of God, then evolution would indeed be likely to lead that person to atheism. However, this is a long way from saying that evolution implies atheism. Perhaps for some people, perhaps even some creationists, biological complexity is the sole support for their belief in God. If so we could understand why they would defend it against evolution with such vigor. Most theists, however, have a more robust faith, and it is important that they not allow creationists to mislead them, with a simplistic two-world-view dilemma, into believing that they must choose between evolution and God.

Defenders of evolution should also be clear about this. We tend to allow creationists to set the agenda. Biologists who accept a debate challenge from the Institute of Creation Research (ICR) easily agree to their condition that religion not be mentioned and that the debate be limited to the contest between evolution and "creation-science." ICR boasts that Duane Gish has won every one of the hundreds of debates he has had (Gish, 1993, p. vi).

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How can this be, given the scientific weakness of the creationist arguments? Clearly, just presenting the scientific evidence for evolution in a debate with a creationist will be of little use if the audience feels that truth, beauty, morality and their Christian faith are at stake and riding on the outcome. Even if one is not able to make explicit the other arguments we have discussed, at the very least defenders of evolution need to reassure their listeners that evolution is not synonymous with atheism, since that fear is at the root of all the other worries. How can we make this point clear?

First of all, there is a simple matter of logic: "not necessary that X" does not imply "necessarily not X" or even "not X." It is easy to get confused about such modal locutions and one can understand that someone could mistake the weak claim that evolution shows that God's existence is not necessary to explain biological phenomena for the stronger claim that evolution shows God's non-existence or the necessity of God's non-existence. I find very few evolutionists who make this simple sort of mistaken argument, but I can certainly support Johnson and other creationists' complaint when they find someone who does.

Second, losing one positive argument for the existence of God, even an important one, does not undermine other positive arguments. The germ theory of disease gave a mechanistic explanation of the origin and transmission of infectious diseases like the plague, obviating the "need" to postulate that such diseases were a divine punishment for moral degeneracy or disobedience of God's laws. The germ theory of disease was naturalistic in the same way that evolutionary theory is, but we do not think that showing that God is not necessary to explain plagues implies that there is no God, since undermining that positive argument does not impugn other ones. Of course evolutionary theory is powerful in that it undermines a whole class of such arguments, but theists historically have offered a wide variety of reasons for belief in God, including other versions of the teleological argument, that evolution does not touch.

Finally, no matter how strong the scientific evidence for any empirical conclusion, from a merely logical point of view it can never completely negate the possibility of the existence of God, for the theistic realist always has a way to bring God back in at any point. As an omnipotent, supernatural being, God could intervene at any or all points in the process, either to create organisms wholesale or to guide evolutionary development, and to do so in a way that we could never discover scientifically. An extreme example of this is the "appearance of age" creationist view, which holds that the world was created by God 6,000 years ago as the Bible says, but in such a way that it appears to be much older. More subtle versions, such as one extensively discussed on one of the creationist electronic discussion groups, suggest that God creates the mutant variations upon which natural selection works, but in so nuanced a manner that they appear random to us. Evolutionary theory can never disprove such views for the same reason that science cannot disprove philosophical skepticism, so even Genesis literalism will always remain a logical, if not a reasonable, possibility. But it is exactly because such creationist views are radically untestable that creationism falls outside the realm of science. Science excludes appeal to supernatural entities as a point of method, and thus it is improper to draw directly the atheistic conclusion that God is ontologically unreal from evolution or any other scientific conclusion. Such questions are not scientific and must be left to the theologian and the philosopher.

In most of his writings and talks Johnson quotes Richard Dawkins's comment that Darwin's theory finally made it possible to be "an intellectually-fulfilled atheist," suggesting that upon the truth or falsity of evolution rests the entire issue of atheism versus theism. But we are now in a position to understand the force and limits of Dawkins's claim. He is not saying that evolution makes one an atheist, but that evolution allows someone who is

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already an atheist to feel intellectually satisfied. Why? Because prior to Darwin, the atheist had no good natural explanation for biological phenomena. Evolutionary theory filled the large explanatory gap that had made the atheist feel ill at ease. Perhaps Dawkins is one of those for whom this was personally the last significant gap to be filled, and, if so, it could be that he thus thinks that evolution does lead to atheism. But we should now be clear that this is not a foregone conclusion. Evolution does not necessarily lead to atheism, and if defenders of evolution regularly made this clear it might open the fearful hearts of their audience, which is the first step to opening their minds to the evidence.

Johnson does occasionally admit, usually in a footnote or appendix, that evolution is not necessarily atheistic. For example, he writes:

> The blind watchmaker thesis makes it *possible* to be an intellectually fulfilled atheist by supplying the necessary creation story. It does not make it obligatory to be an atheist, because one can imagine a Creator who works through natural selection (RIB, p. 77).

Elsewhere he acknowledges that "scientific naturalists do not claim to have proved that God does not exist" (RIB, p. 50). However, as we saw, Johnson forgets this critical fact in places where it counts most. He forgot it in his discussion of the basis of natural law in which he says that "From a naturalistic standpoint...the Creator God of the Bible is every bit as unreal as the gods of Olympus, and the commands of an unreal deity are in reality only the commands of an ancient priesthood" (RIB, p. 39). He forgot it in his condemnation of contemporary liberal rationalism, which he says "incorporates the naturalistic doctrine that God is unreal, a product of the human imagination" (RIB, p. 40). He forgot it in his original definition of naturalism: "*Naturalists*...assume that God exists only as an idea in the minds of religious believers" (RIB, p. 7). One could easily cite a dozen or more similar statements or implications throughout *Reason in the Balance* and many more in Johnson's earlier works in which his central claim is that evolution rests upon a dogmatic naturalistic metaphysics that says the world is a closed system of material causes and effects and "that's all there is."

We have been considering three main views one could take regarding the logical relation between biology and God—that the biological facts make the existence of God 1) impossible, 2) possible, or 3) necessary. We have seen that evolution does not imply that God's existence is impossible, only that God's intervention is unnecessary to explain the biological facts. Evolutionary science, like all other sciences, is neither theistic nor atheistic in the ontological sense, but is agnostic, leaving God as a possibility that is outside the boundary of its methods of investigation. But Johnson is not satisfied with the compromise view that scientific naturalism allows God as a possibility. Immediately following each of the above brief admissions that evolution is not atheistic Johnson quickly dismisses the possibility of God that is left open as unsatisfactory. It is not surprising that Johnson wants his readers to reject or ignore the intermediate position and its many variants, since that shatters the two-world-view dilemma that he wants to set up. Defenders of evolution would help their case immeasurably if they explicitly rejected the creationists' contention that evolution is atheistic and reassured their audience that morality, purpose, and meaning are not lost by accepting the truth of evolution.

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Final Recommendations

I have argued that creationists are not primarily worried about the status of evolution as scientific theory, nor are they simply repelled by the idea of being descended from apes, rather they are motivated by a crisis of meaning. Given their theological view that the only source of morality and value is in the divine authority, they fear that life would have no meaning if we were formed by the purposeless processes of evolution rather than by the direct purposeful creative will of a divine intelligence. We have seen how creationists in general, and Phillip Johnson in particular, see the debate about evolution as a holy battle between two incompatible world views, one—theistic realism—that upholds truth, goodness and beauty, and another—evolutionary naturalism—that undermines the same, leading to moral decay in every aspect of society, not to mention the loss of hope for an eternal afterlife.

With so much seemingly at stake it is no wonder that creationists are unable to judge the evidence for evolution with an open mind. I have recommended that defenders of evolution attempt to calm these existential fears that creationist leaders engender in the way that they frame the dilemma by explicitly challenging the two-world dichotomy not just on the empirical level but also on the level of values, reassuring their audiences that evolution does not imply atheism or moral nihilism. Meaningfulness may be found everywhere we turn no matter how it was that we came to be. The meaning we may find in the beauty of nature, in the love of our families, in the expression of our hopes and ideals, or in the discovery of an elegant equation that expresses a natural law depends not at all on whether our capacity for appreciation arose in an evolutionary process or in a special act of creation. The way to assuage the existentialist fear will vary depending upon the specific form that the worry takes, but let me conclude by showing how one might address the fear in the most extreme sort of case.

Let us take someone who is unmoved by arguments that morality and values are grounded independently of God and who, following Johnson, insists that it is by divine authority alone that our lives could come to have purpose and meaning. Let us also be forthright in stating the truth of evolution as best science understands it given the evidence at hand: we are descended from earlier primate forms that also gave rise to our closest evolutionary cousins, the pygmy and the common chimpanzees and the gorillas, though many of the details of our evolutionary pathway are still unknown, and that the mechanism that produced us involved natural selection of heritable random variations. Finally, for the sake of argument, let us even go beyond these empirical conclusions and hypothetically accept the unscientific metaphysical claim that Johnson unfairly attributes to evolutionary science, namely the dogmatic assertion that God in fact did not directly intervene physically in any stage of this creative process. Is such a person's life thereby necessarily rendered purposeless and meaningless? Certainly not. We are still the same beings with the same capacities and longings.

Whatever the purposes we may be expected to fulfill on Johnson's or some other creationist's view of origins, we are no less capable of fulfilling them by having arrived at these capacities by an evolutionary process. Ask creationists what they believe our purpose to be and then ask why we should fear that our evolutionary origin precludes our fulfilling it. Surely nothing of value is necessarily lost by acknowledging the truth of evolution. Indeed, most Christians will probably answer that our purpose in life is to praise God, to accept Jesus as our Lord and Savior, to ask for spiritual grace and, as Johnson says, to ultimately fulfill our purpose "in eternity" (RIB, p. 7). What is it about evolution that in any

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way rules out the pursuit of such notions of purpose and meaning? Even the confirmed atheist would have to admit that evolutionary theory itself does not exclude such a possibility. If there is a God, then God could give us spiritual purpose no matter how we came to be.

When Johnson or another creationist says that we must choose between evolution and morality, or evolution and purpose, or evolution and meaningfulness, let us reject the dilemma and try to calm the fears the purported choice engenders, if only with a rhetorical query: "Are you saying, Professor Johnson, that an omnipotent God, omnipresent in space and time, could not have allowed humans to arise through an evolutionary process while still giving us a moral code to uphold, a purpose to fulfill, and a life filled with meaning? Surely this would not be impossible for God, so certainly the choice is not so stark as you portray it."

Let us not polarize the debate and return to a view that holds religion to be necessarily at war with science. Christianity was eventually able to recognize the truth of Galileo's disturbing findings and adapt to their implications, and most Christian denominations have absorbed Darwin's findings in a similar manner. Creationists no doubt find meaning in their picture of the world, but meaningfulness cannot be long sustained upon a falsehood. Evolutionists are no less concerned about morality and about the meaning of life and should be forthright that these are not incompatible with evolution. If we are able to calm the divisive fears that evolution is the root of an atheistic philosophy that leads to purposelessness and immorality and reassure the creationist that evolution does not bar the roads to meaningfulness, then, and perhaps only then, will the Creation controversy be put behind us so we may travel those roads together.

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Commentary:

Is Science's Naturalism Metaphysical or Methodological?

A review of *Reason in the Balance: The Case Against Naturalism in Science, Law, and Education* by Phillip E. Johnson. Downers Grove, IL: InterVarsity Press, 1995.

Review Essay by Karl D. Fezer

Phillip Johnson has a keen nose for hypocrisy, concealed contempt, assumptions passed off as facts, claims made true by definition, intellectual power plays, and logical inconsistencies—especially in those he opposes. We "liberals," who are Johnson's target, can benefit by taking his accusations and arguments seriously. Johnson is a professor of law at the University of California-Berkeley, and his analyses of various First Amendment cases, his discussion of natural law, and his evaluation of intellectual trends in the history of American jurisprudence are all interesting—informed as they are by his contrarian viewpoint. But in spite of its valuable insights, the book's overall thesis fails because of what I find incomprehensible in a scholar of Johnson's stature—his apparent failure to understand the essence of scholarship.

Reason in the Balance is the second book in Johnson's anti-Establishment campaign. The first was *Darwin on Trial* (Johnson, 1991) in which, Johnson thinks, he demolished the case for evolution and provided the scientific justification for his present claim that "scientific naturalism and liberal rationalism" (or, for short, just plain "naturalism" or "modernism") are the unjustified but established orthodoxy in the academic, legal, and educational communities. That orthodoxy, says Johnson, is enforced through such career-threatening processes as tenure decisions and peer reviews. This is not so much a plot to suppress alternative views as it is an in-group mind-set that prevents consideration of alternatives by imposing unjustified limits on what is considered "rational." In particular, this naturalistic culture considers religious thought and belief irrational and thus marginalizes it. So pervasive is this mind-set that even theologians have been coerced or persuaded into accepting its basic tenets. "Purportedly neutral judicial decisions and academic pronouncements" often are laden with "implicit contempt for Christian theism" (p. 180).

Chapters three and four describe what Johnson calls the "grand metaphysical story of science." Johnson draws on popular writings of highly regarded scientists such as Stephen Hawking, Carl Sagan, Francis Crick, Richard Dawkins, and Stephen Jay Gould. By and large I think he treats them fairly. Johnson discusses the reductionistic quest by physicists for "theories of everything," the materialist understanding of the mind, and the claim that life evolved and did so as the result of chance and purpose-free processes. He points out various well-known philosophical challenges to these positions. Johnson's chief criticism is that the grand metaphysical story of science claims "to have demonstrated that God as Creator is superfluous, because purely natural forces were capable of doing and actually did

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do all the work of creation" (p. 50). This, Johnson says, goes far beyond what has been rigorously demonstrated. "All statements made in the name of science are not equally reliable" (p. 68). True enough!

Johnson describes himself (pp. 48-49) as a "theistic realist" who is "convinced that God is objectively real," specifically the God "of Christian theism and of the Bible." Specific consequences include, for example, that "a human being is created in the image of God and endowed from the earliest moment of development with that divine image" (p. 135). "The reason living things [appear to be the products of intelligent creation] is that they actually are ... and this fact is evident to all who do not cloud their minds with naturalistic philosophy or some comparable drug" (p. 108). (Slurs like this are rare in the book.) To be rational is to take account of the truth. If he is right, says Johnson, it is naturalists who are irrational when they deny divine purpose.

In a section called "The Governing Discipline" (pp. 103-105) Johnson asserts:

> There is a need for a discipline at the top of the hierarchy of sciences which studies knowledge itself in the most general sense and for that reason governs the more specialized disciplines ... if God is real and constitutes the true basis of all knowledge, then we call the governing discipline *theology*.

In elaborating this assertion Johnson seems to come close to advocating theocracy.

However, in another section called "Culture War or Democratic Debate?" (pp. 184-185), Johnson advocates civil discourse among the proponents of different world views. "It is much safer to stay within a community of belief, where potentially awkward issues are off the table by mutual agreement. Many churches are filled with people who want to do that, and so are many university departments." As a stellar example of civil dialogue *between* communities of belief Johnson offers his own friendly debates with Cornell evolutionist William B. Provine.

In a debate with Johnson on April 30, 1994, transcribed in *Origins Research*, Provine said:

> "Let me summarize my views on what modern evolutionary biology tells us loud and clear—and these are basically Darwin's views. There are no gods, no purposes, and no goal-directed forces of any kind. There is no life after death....There is no ultimate foundation for ethics, no ultimate meaning in life, and no free will for humans, either" (Provine and Johnson, 1994: 9).

Provine goes on to argue that, nevertheless, "atheistic humanism" can produce an effective ethical system and meaningful lives.

According to Johnson (Johnson, 1995: 189), he and Provine agree that "both Christian educators and the rulers of science have an incentive to keep the underlying world view conflict implicit rather than explicit." Johnson and Provine also agree that doing so is intellectually dishonest; in a footnote on page 190, Johnson describes as "Orwellian doublespeak" a 1984 pamphlet by the National Academy of Sciences Committee on Science and Creationism (NAS, 1984). In the debate, Provine prided himself on driving students either away from or toward a naturalistic world view, that is, away from any intermediate compatibilist position. Johnson and Provine are both polarizers.

Like many creationists, Johnson accepts microevolution but challenges macroevolution. Unanswered questions about the Cambrian explosion, the origin of life, the origin of

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new genetic information, and the origin of complexity loom large in his thinking. (Has he never heard about duplication mutations and their role in complexification?) In their debate, Provine pointed out that Johnson rejects the common ancestry of chimpanzees and humans, but allows microevolution among species of the Hawaiian *Drosophila*, a divergence much greater in morphology and genetic distance.

In *Reason in the Balance*, what really does concern Johnson is what he sees as the breakdown of morality: "The law," says Johnson, "needs to stop undermining the values that make people responsible citizens and start reinforcing them. [The government] should discourage any tendency toward self-indulgent hedonism" (p. 151).

America's "moral deficit" Johnson sees as abetted by metaphysical confusion in academe, the law, and education. He argues that realism, defined by Berkeley philosopher John Searle (p. 14) as "holding that objectivity and truth are possible because there is an independently existing reality to which our true utterances correspond," is under attack. Natural science is based on realism, but relativists and neopragmatists, notably University of Virginia philosopher Richard Rorty, have challenged this belief, not only for science, but even more in the realm of moral values. Johnson says, "Materialist rationalists agree with pragmatists that values, unlike particles, are created by human beings" (p. 124). Darwinism has "fatal consequences for metaphysical realism (at least on issues of value)" (p. 129). Most university people are distressed by the growth of irrationalism. Trouble is, says Johnson, proposed solutions based on naturalistic metaphysics provide only "illusory means of escape" (p. 131). "If God does not exist...then there may be no absolute reference point from which to judge competing interpretations of reality" (p. 124).

> Following the death of God there remains no universally accepted source of moral authority. [Now], the all-purpose response to assertions of authority in our society is "the grand sez who" (a phrase coined by Arthur Leff of Yale Law School) (p. 147).

The idea that nature is all there is is what Johnson calls "scientific naturalism," and he traces it primarily to Darwin. "Liberal rationalism" he describes as the secular legacy of such pre-Darwinians as Thomas Hobbes, John Locke, David Hume, and Adam Smith. "Because liberalism starts with individual rights and autonomy, its morality tends to become progressively more relativistic and even permissive" (p. 41).

Johnson wants to confront "the grand metaphysical" story of naturalism with bold assertion of the grand metaphysical story of Christianity: that the universe was created by God for a purpose and that it is not a meaningless chain of material causes. When thus confronted, says Johnson, naturalists retreat into a sanctuary called "science."

> At this point we begin to hear that the naturalists have merely been defining the particular rules of a game called "science," that science never claims to have absolute truth, that naturalists have never claimed that creationism is *false* but merely that it is not "science," that "evolution" is a modest doctrine of biological change that says nothing about ultimate origins, and even that science itself is neutral about "the existence of God" and is therefore fully compatible with "religion." I encounter these evasions constantly in debates, but I know that the moment my opponents think the coast is clear, they will go back to proclaiming absolute truths. Of course the scientific naturalists claim to have absolute truth, and of course they reject theistic religion as false (pp. 203-204).

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This may accurately describe *some* scientific naturalists. (Provine never "retreats" into "evasions" in the first place.) But many of us never proclaim absolute grand metaphysical truths. Or if we do, we emphasize that we are describing our private world view, not the scientific consensus.

The problem with both grand metaphysical stories, indeed, with any comprehensive metaphysical story, is "the grand sez who." Scholarship involves justifying one's claims, not just asserting them. Scholarship, therefore, needs to be very concerned with questions of *epistemology*. Reality may be real, and we desire to know the truth about it. But we have abundant reason to think that truth does not come easily.

The history of scholarship reveals a gradually growing awareness of the foibles of human thought and a related questioning of authority—religious, governmental, or otherwise. To be a scholar one must certainly be knowledgeable in some domain. To be a great one, one must creatively weave a new fabric from diverse strands of thought. But there is a third requirement, related to the first: one must be aware of the many ways that human thought can go astray. Such awareness tends to promote caution in putting forth one's own ideas (Darwin serves as a fine model) and skepticism about the ideas of others. I define rationality as being aware of reasons for doubt and doing one's utmost to overcome them.

Religious authority, like other authority, was bound to be questioned, and *was* questioned, long before Darwin. Even before the time of Christ, Hebrew theologians disagreed with one another on how scripture should be interpreted. Respected modern theologians are fully aware that they are part of this critical tradition. Johnson may say they are respected because they have succumbed to naturalism. I say scholars gain respect on the basis of their intellectual contributions, their knowledge of and their ability to discriminate between work of high and low quality in relevant fields, and their concern about being able to justify their assertions. Scholarship *within, and constrained by*, a system of thought may be used to bolster the authoritarian claims of that system. But the scholarly tradition as a whole is inherently anti-authoritarian. Johnson wishes it to be otherwise.

It is, indeed, very difficult to know anything for sure about the real world. Therefore scholars should emphasize that their conclusions are tentative and subject to revision. The natural sciences have flourished, not by starting with grand metaphysical schemes, but by emphasizing details and building brick upon solid brick. Isaac Newton's grand synthesis was based in large part on Johannes Kepler's laws of planetary motion, which were based on Tycho Brahe's meticulous measurements on the orbit of Mars. Darwin's argument in *The Origin of Species* is based on a tremendous accumulation of evidence. The subject matter of the natural sciences allows such an approach, and scientists have been able to answer many specific questions. The social sciences, philosophy, and theology, which sometimes deal with questions of greatest human concern, are inherently less able to produce definitive answers. Johnson's dream that theology might serve as a "governing discipline" seems totally out of touch with the reality he says we should covet.

The various forms of relativism and pragmatism are natural outgrowths of the critical tradition and of the difficulties inherent in attempts to know reality. Some people go overboard and deny the possibility for any meeting of minds among different communities of belief. Science provides abundant evidence to the contrary, and I believe most of us would agree that, in most human circumstances, some behaviors, attitudes, and social arrangements are objectively better than others. Johnson and I would find much on which we could agree, which could lead to partial agreement on how to tackle social problems. In contrast, declaring that ultimate truth has been revealed and must be followed would impede the process.

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One valid relativistic insight is that different systems of thought are based on different premises and have different goals and different histories. These in turn influence the conclusions reached by the system. As Johnson points out, even if supernatural explanations are true, science cannot possibly discover them if it has ruled them out *a priori*. I agree with Johnson that it is important that this be understood about science. This understanding reveals science as a system of thought that is remarkably good at discovering and justifying detailed, specific assertions about the world *because of* self-acknowledged and self-imposed limits on its domain of competence. This understanding reveals science's naturalism to be for a limited human purpose—that is, it is *methodological*. Consistent with its own standards, science cannot make any sweeping metaphysical claims about what kinds of things do not exist. Johnson argues that science should be more open to evidence of God's creative acts, but he doesn't disagree when he quotes Searle: "It is a mistake to assume that everything that exists is comprehensible to our brains. Of course, methodologically, we have to act as if we could understand everything, because there is no way of knowing what we can't" (p. 125). I take that to mean that naturalistic mechanisms must be assumed if they are to be discovered.

It should come as no surprise that many individual scientists, such as Provine, extrapolate from hard evidence and, as part of their private world view, apply the rules of their profession to reach metaphysical conclusions about what kinds of things do or do not exist. Provine obviously is impressed by the explanatory power of evolutionary theory and sees no justification for invoking supernatural concepts. Johnson (much less familiar with the evidence) is impressed by as-yet unanswered questions. Provine and Johnson each judge the evidence adequate to justify his own position and inadequate to justify their opponent's. *But there are no generally accepted criteria for when an explanation should be felt to be adequate*. We have no alternative but to consign such judgments to the private world view of each individual. Johnson is right to challenge scientists who, in speaking to the public, fail to distinguish between well-documented conclusions of science and their own metaphysical extrapolations.

Where to draw that line is not obvious. Consistent with the universal intent of science, I think scientists should err on the side of caution. I think they are justified in speaking confidently of the 4.5-billion-year age of the earth and of the distribution of different kinds of organisms in the geologic column. To deny, as Johnson does, that diverse organisms are related by descent from common ancestors is, I think, ignorant or perverse. (If the case for the endosymbiont hypothesis of the origin of mitochondria is as persuasive as I think it is, life *must* have evolved.) To predict, as Johnson does (p. 92), that the entire field of molecular evolution will go the way of alchemy betrays his deep ignorance of it. The mechanisms of evolution we understand appear to be purposeless, but there is disagreement among scientists as to whether we know all the mechanisms involved. And knowing the mechanisms does not demonstrate ultimate purposelessness. It is clear that we do not yet have an adequate theory of the natural origin of life. Metaphysical assertions about what kinds of things do *not* exist are necessarily beyond the reach of science.

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Book Review

Darwin's Black Box: The Biochemical Challenge to Evolution
by Michael J. Behe, 1996. The Free Press, New York

Reviewed by Kenneth R. Miller, Professor of Biology, Brown University, Providence, Rhode Island

Perhaps the single most stunning thing about *Darwin's Black Box,* Michael Behe's "biochemical challenge to evolution," is the amount of territory that its author concedes to Darwinism. As tempted as they might be to pick up this book in their own defense, "scientific creationists" should think twice about enlisting an ally who has concluded that the earth is several billion years old, that evolutionary biology has had "much success in accounting for the patterns of life we see around us" (p. 4), that evolution accounts for the appearance of new organisms including antibiotic-resistant bacteria, and who is convinced that all organisms share a "common ancestor." In plain language, this means that Michael Behe and I share an evolutionary view of the natural history of the earth and the meaning of the fossil record; namely, that present-day organisms have been produced by a process of descent with modification from their ancient ancestors. Behe is clear, firm, and consistent on this point. For example, when he and I engaged in debate at the 1995 meeting of the American Scientific Affiliation, I argued that the 100% match of DNA sequences in the pseudogene region of beta-globin was proof that humans and gorillas shared a recent common ancestor. To my surprise, Behe said that he shared that view and had no problem with the notion of common ancestry. Creationists who believe that Behe is on their side should proceed with caution: he states very clearly that evolution can produce new species and that human beings are one of those species.

Michael Behe is Associate Professor of Biochemistry at Lehigh University, and, not surprisingly, biochemistry, his own discipline, is at the heart of his argument. Simply stated, he claims that Darwinism, whatever it may explain at the organismic level, fails to account for the evolution of the complex biochemical machinery that is found in every living cell. He writes: "for the Darwinian theory of evolution to be true, it has to account for the molecular structure of life. It is the purpose of this book to show that it does not" (p. 25).

Behe engages in some rhetorical heavy lifting to support this contention. In the first half of his book the reader is treated to a lively description of some of the most intricate of life's microscopic machinery—the cilia and flagella that produce cell movement, the cascade of blood-clotting proteins, the systems that target proteins to specific sites within the cell, the production of antibodies by the immune system, and the intricacies of biosynthetic pathways. Behe's descriptions of these systems are a delight to read. He is an excellent writer and describes the complexities of the cell with the flair of a gifted teacher.

Why does the existence of these (and many other) systems rule out evolution? Because they are "irreducibly complex," meaning that if they are missing just one of their many parts, they cannot function. Behe writes that "irreducibly complex systems ... cannot evolve in a Darwinian fashion" (p. 111). Why not? Because natural selection works on small mutations in just one component at a time. If dozens or even hundreds of distinct proteins, precisely fashioned, are required to make a functional cilium, how could natural selection

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slowly and patiently craft them, one at a time, while waiting for the complex function of ciliary movement to emerge? It couldn't, so, according to Behe, the hypothesis that the cilium was produced by evolution is therefore disproved. If evolution did not make the cilium, then "intelligent design" must have. He writes: "Life on earth at its most fundamental level, in its most critical components, is the product of intelligent activity" (p. 193).

If all of this has a familiar ring, it should. It is the classic "argument from design," articulated so well by William Paley nearly 200 years ago in his book *Natural Theology*. Behe is candid in his admiration for Paley, and although he takes care to point out some of Paley's mistakes, he leaves no doubt that he views the argument from design as his principal logical weapon against Darwinism. To Behe the intricacy and complexity of natural systems at the biochemical level shows evidence of intelligent design.

At its core, Behe's argument is about the *mechanism* of evolution, which distinguishes him from "young-earth creationists" who deny the validity of the geological ages, reject the appearance of new species, and attempt to prove that the fossil record is either an illusion or a vast conspiracy. Behe will have none of this and explicitly denies any connection with "creationism" (p. 5). Nonetheless, he recognizes that his ideas do have theological implications as well as scientific ones. He is not at all modest about these implications, comparing the discovery of design to achievements of "Newton and Einstein, Lavoisier and Schrödinger, Pasteur and Darwin" (p. 233), and he believes that he knows why the scientific community has not embraced intelligent design to explain cellular complexity. "Why is the observation of design handled with intellectual gloves? The dilemma is that while one side of the elephant is labeled intelligent design, the other side might be labeled God" (p. 233). So, according to Behe, design is rejected by the scientific community for the most non-scientific of reasons—its theological significance.

Behe has gone two centuries into the past to find the argument from design, dusted it off, and invigorated it with the modern language of biochemistry. But there are problems in this excursion. Not the least of these is the fact that the argument from design has been answered, not once, but many times by writers such as Dawkins, Gould, and even Darwin himself. The multiple parts of complex, interlocking biological systems do not evolve as individual parts, despite Behe's claim that they must. They evolve together, as systems that are gradually expanded, enlarged, and adapted to new purposes. As Richard Dawkins successfully argued in *The Blind Watchmaker*, natural selection can act on these evolving systems at every step of their transformation.

As factual examples we could choose any of the systems whose evolution is documented by the fossil record, a source apparently acceptable to Behe. The three smallest bones in the human body—the malleus, incus, and stapes—carry sound vibrations across the middle ear, from the membrane-like eardrum to the oval window. This five-component system fits Behe's test of irreducible complexity perfectly—if any one of its parts is taken away or modified, hearing would be lost. This is the kind of system that evolution supposedly cannot produce. Unfortunately for "intelligent design," the fossil record elegantly and precisely documents exactly how this system formed. During the evolution of mammals, bones that originally formed the rear portion of the reptilian lower jaw were gradually pushed backwards and reduced in size until they migrated into the middle ear, forming the bony connections that carry vibrations into the inner ears of present-day mammals. A system of perfectly-formed, interlocking components, specified by multiple genes, was gradually refashioned and adapted for another purpose altogether — something that this book claims to be impossible. As the well-informed reader may know, creationist critics of this interpretation of fossils in the reptile to mammal transition once charged that this could not have

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taken place. What would happen, they joked, to the unfortunate reptile while he was waiting for two of his jaw bones to migrate into the middle ear? The poor creature could neither hear nor eat! As students of evolution may know, Fuzz Crompton of Harvard University brought this laughter to a deafening halt when he unearthed a fossil with a double articulation of the jaw joint—an adaptation that would allow the animal both to eat and hear during the transition, enabling natural selection to favor each of the intermediate stages.

Is there something special about biochemistry that prevents evolution from doing exactly the same thing to a microscopic system composed of proteins? Absolutely not, but evolution *does* make a testable prediction with respect to such systems. That prediction is that the degree of similarity in DNA sequences of organisms should correspond to their evolutionary histories. And, as Behe is all too well aware, *that* prediction has been borne out a thousand times over.

Despite the close correspondence of gene sequence to fossil sequence, Behe demands that evolutionary biologists should tell us exactly *how* evolution can produce a complex biochemical system. This is a good strategic choice on his part, because the systems he cites, being common to most eukaryotic cells, are literally hundreds of millions of years old, and, being biochemical, they leave no fossils. Once burned, twice shy, Behe may be hoping to avoid the fate of his 1994 claim that there were no transitional fossils linking the first fossil whales with their land-dwelling Mesonychid ancestors.[1] Less than a year after that prediction, the existence of not one, not two, but three transitional species between whales and land-dwelling Eocene Mesonychids was confirmed. Nonetheless, it is quite possible to rise to the occasion and answer his challenge in biochemical terms. In fact, Russell Doolittle, whose investigations on the evolution of blood clotting are discussed in this text, has done exactly this.

Behe is at great pains to disqualify this work, even though Doolittle has not only shown how such a complex system *might* evolve, but has also produced comparative studies showing how it probably *did* evolve. In dismissing Doolittle's work, and in pre-empting any attempt to show how evolution might produce a complex biochemical system, Behe scoffs at the notion that a biochemical system adapted for one purpose might be adapted by evolution for a totally different function, despite physiological examples to the contrary in the fossil record. He dismisses, for example, the notion that the parts of a cilium, including proteins like dynein and tubulin, could have evolved by gene duplication even though similar forms of dynein and tubulin are used for other purposes in the cell. Most cell biologists will be unconvinced by his explanations of why the cilium could not have been assembled from proteins originally used for other purposes—especially since the cilium itself has been adapted for another purpose in one of the very tissues that Behe uses as an example of design—the vertebrate photoreceptor cell.

As the book draws to a conclusion, Behe attempts to develop the idea of intelligent design into a testable, scientific hypothesis. This is a lofty goal but this is also where his argument collapses. Scientific ideas must be formulated in terms that make them testable. Indeed, Darwin himself proposed several ways in which his theory might be tested and disproved. And one of these ways—the contention that organisms contain biochemical parts that could not have been produced by Darwinian means—is the basis of Behe's criticisms of evolution. One would have expected that a trained experimental scientist like Behe would have seen the need to do likewise. Unfortunately, he did not.

Let's suppose, for example, that a fellow scientist were to take Behe's challenge to evolution seriously and attempted to show how a specific biochemical system composed of multiple parts could have evolved. A hypothesis for design, formulated in genuinely scien-

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tific terms, must be disprovable, and this is exactly the kind of evidence that might disprove it. Incredibly, Behe has intentionally insulated "intelligent design" from this and any other scientific test. How has he done this? In the penultimate chapter of his text, he lists some of the driving forces associated with evolutionary change, including natural selection, genetic drift, founder effects, gene flow, meiotic drive, and transposition (p. 229). Behe states that all of these agents can effect change in biological systems and admits that they may account completely for at least some of the biochemical features of a living cell. So, if our colleague were to show how these forces could have produced, say, the bacterial flagellum, would he be entitled to say: "I have disproved design"? Not at all, according to Behe. "The production of some biological improvements by mutation and natural selection—by evolution—is quite compatible with intelligent design theory" (p. 228). In other words, any evidence for the evolution of complexity is dismissed in advance as being irrelevant to the problem of design. "Design" exists only when and where evolution cannot explain it!

This sterile definition of design means that Behe is free to ignore *any* conceivable evidence for the evolution of any biochemical system. Such an idea, intentionally placed outside the realm of testability, is not science, whatever the pretensions of its advocates.

If Behe's formulation of intelligent design as science is illogical, his mechanism for how the work of the designer was inserted into living systems is almost laughable. Remember that Behe accepts the validity of the geological ages and the fossil record—an open-minded scientist can hardly do otherwise—and yet he claims that the complex biochemical systems he extols were fashioned by an intelligent agent. When did this agent go to work, and when were the genes encoding them engineered? He has an answer ready:

> Suppose that nearly four billion years ago the designer made the first cell, already containing all of the irreducibly complex biochemical systems discussed here and many others. (One can postulate that the designs for systems that were to be used later, such as blood clotting, were present but not "turned on." In present-day organisms plenty of genes are turned off for a while, sometimes for generations, to be turned on at a later time.) (p. 228).

This means that billions of years ago a humble prokaryote was packed with genes that would be turned off for hundreds of millions of years before they produced the eukaryotic cilium, and genes for blood-clotting proteins that would pass more than a billion inactive years in genetic "cold storage." And what happens during those billions of years? As any student of genetics will tell you, because those genes are not expressed, natural selection cannot weed out genetic mistakes. This means that mutations will accumulate in these genes at breathtaking rates, rendering them hopelessly changed and inoperative hundreds of millions of years before Behe says that they will be needed.

Contrary to Behe's claims, the evidence of evolution in the fossil record is not irrelevant to his argument. It has forced him, for the sake of consistency, to cobble his acceptance of the earth's well-documented natural history together with the doctrine of intelligent design. The result is an absolutely hopeless genetic fantasy of "pre-formed" genes waiting for the organisms that might eventually need them to appear. This absurdity is the unavoidable result of trying to make "design" conform to that troublesome fossil record. The very same fossil record that provides the primary evidence for evolution.

However serious its scientific flaws, this interesting and colorful book is sure to attract attention. Michael Behe would like us to believe that he has discovered a new biological principle. But the real news in *Darwin's Black Box* is that a contemporary scientist has

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dipped back into the past and wrapped the remains of the argument from design in a shiny cloth of biochemistry. In this new clothing, the old idea may surprise a few unsuspecting readers who have not thought long or seriously about the mechanisms of evolution. They may be entertained by Behe's energy and sustained by his enthusiasm. But ultimately, the careful reader will recognize this book for what it truly is—an argument against evolution that concedes nearly all the contested ground to Darwin's edifice and ends up teetering on little more than rhetoric and personal skepticism.

Note

[1] Behe wrote "...if random evolution is true, there must have been a large number of transitional forms between the Mesonychid and the ancient whale. Where are they? It seems like quite a coincidence that of all the intermediate species that must have existed between Mesonychid and whale, only species that are very similar to the end species have been found." in *Darwinism, Science or Philisophy?* edited by Jon Buell & Virginia Hearn, p. 61. Houston, Foundation for Thought and Ethics. The Mesonychid-whale transitional fossils are discussed in a commentary on this volume by Neil Wells in *Creation/Evolution* 16, no. 1 (1996): 16 - 23. C/E

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Book Review

Dinosaur Extinction and the End of an Era: What the Fossils Say
by J. David Archibald, 1996. Columbia Univ. Press, NY. 237 pp.

Reviewed by Daniel G. Blackburn, Department of Biology, Trinity College, Hartford, CT.

About 65 million years ago, when dinosaurs were at the peak of their diversity, a major cataclysm precipitated by a huge asteroid wiped them from the face of the planet—but entirely spared the mammals, who by default inherited the earth's ecosystems. This is a popular explanation, having been publicized by scientific reviews, news articles, and television documentaries. It is also, in several key respects, most probably wrong. And the problem reflects more than the fact that dinosaurs are not technically extinct—that as saurischian descendants, birds are classified biologically as a type of dinosaur, vernacular usage notwithstanding.

In recent years, a more complex picture of the end of the Mesozoic has been emerging. J. David Archibald's *Dinosaur Extinction and the End of an Era* offers a broad survey of paleontological and geological evidence in an attempt to determine just what happened at the Cretaceous-Tertiary (K-T) boundary. The results are engrossing, although any reader seeking easy answers and simple causes may be dissatisfied. All the better, because Archibald's book challenges the reader to grapple with the kinds of ambiguities and complexities that are inescapable in paleontological study.

Professor David Archibald, a member of the biology faculty at San Diego State University, brings to the issues an expertise in North American mammals of the late Cretaceous, the small beasts who lived, in Stephen Jay Gould's phrase, "in the interstices of the dinosaur's world." Patterns of extinction and survival across the K-T boundary in these and other species offer a powerful way to test hypotheses about the causes and duration of the late Mesozoic extinctions. The focus of Archibald's book is the Hell Creek Formation of eastern Montana, described as the only site worldwide that has yielded detailed evidence about the fate of individual species across the K-T boundary. Study of this site is important, because if some (non-avian) dinosaurs persisted into the early Cenozoic, as has been claimed from work in China, or if North American dinosaurs were experiencing a long-term decline in the late Mesozoic, then the extinctions may have occurred over a protracted time period under the influence of a variety of causal factors.

Archibald introduces the reader to the many elements that must be considered in paleontological interpretation. Definitive determination of when a taxon has gone extinct is not as easy as one might think, for disappearance of a species in a given site may reflect only a local extirpation, or some combination of diminution and sampling error, or even anagenetic transformation of the species into another. Furthermore, fossils can be "reworked" into overlying sediments under certain conditions. Additional problems may attend analyses by David Raup and others that suggest that mass extinctions have occurred periodically

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every 26 million years. Archibald uses the example of the taxonomic artifact which arises when non-monophyletic taxa or families are analyzed instead of species; spurious patterns can emerge. In view of such factors, the book's subtitle and recurrent refrain that we must listen to "what the fossils say" is curious; if anything Archibald's account demonstrates that sophisticated analysis of observations is crucial and that more than a single interpretation is often possible.

Most of *Dinosaur Extinction* is devoted to evaluation of the evidence for various possible causes of the extinctions, including the effects of the giant asteroid that is thought to have struck the earth at the close of the Cretaceous. Over 51% of the 107 species at Hell Creek went extinct across the K-T boundary. About 75% of these extinctions occurred among the marsupials, lizards, sharks, and dinosaurs; less affected were such groups as turtles, ray-finned fishes, crocodilians, lissamphibians, and placental mammals. That the extinctions were neither near-total nor randomly distributed among the taxa offers a useful data base for testing predictions generated from the hypothetical causes. For example, Archibald reasons that massive world-wide conflagration following asteroid impact ought not have spared some lineages over others, whereas acid rain (indirectly resulting from the impact) would mainly have affected aquatic species. Alternatively, extensive marine regression should have especially affected marsupials (by allowing eutherian competitors to invade from Asia over the Bering land bridge) and the dinosaurs (which are mainly found in the coastal sites represented at Hell Creek).

From his analysis, Archibald concludes that no single factor can account for the patterns of extinction and survival of vertebrates at the Hell Creek site. Rather, *Dinosaur Extinction* opts for a "cacophony of causes" that occurred over a period of several million years, including massive volcanism and marine regression. Asteroid impact may have simply delivered a final, massive blow to groups of organisms that were already diminished before the end of the Cretaceous.

Archibald's analysis undoubtedly will stimulate debate, for his conclusions are sensitive to assumptions about the differential effects of the possible causes of extinction. For example, the facile assumption that massive global cooling would have affected ectotherms far more than endotherms is debatable. Given the high food requirements of endotherms, which expend 80-90% of their assimilated energy on thermoregulation, the associated effects on ecosystems could have had devastating impacts on endotherms. Likewise, to presume that extensive acid rain of pH below 1.0 would have affected amphibians and fishes more than terrestrial forms overlooks the likely effects of the burning rain on terrestrial ecosystems, including plants of the food chains.

A more serious concern has to do with the broad-brush approach taken in the taxonomic comparisons. The taxa are categorized into two groups according to their level of extinction; thus lizards, with only a 30% survival rate, are classified as showing significant extinction, and multituberculates with a 50% survival rate are not. These two categories of taxa are then used to test the hypothetical causes, with each taxon being scored as a simple "yes" or "no"; thus, intermediate effects are not considered. Yet persistence of only one additional species would have placed lizards into the "survivor" category—entirely reversing all the predicted outcomes for that group. Similarly, with loss of only two additional species, multituberculates would represent a "significant extinction"—likewise reversing the associated predictions. The resulting conclusions therefore may be parsimonious interpretations of data that are currently available, but are not necessarily robust. Listening to "what the fossils say" also requires assessing the durability of their message.

As another example, species are divided into two undefined categories by body size

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("large" and "small") to allow examination of the effects of habitat fragmentation following marine regression. The rationale is that larger organisms are more subject to such fragmentation. But comparison of species belonging to distantly-related taxa is highly problematic. Can we assume, without considering species ecology, abundance, or geographic distribution, that any "large" turtle or crocodilian would have been much more vulnerable to habitat fragmentation than any smaller lizard or bony fish, especially when small barriers can be impossible for small organisms to surmount? Such concerns lend weight to criticisms in the geological literature that habitat fragmentation may be untestable in the context of the fossil record.

For a work of this taxonomic scope and disciplinary breadth, errors of fact and presentation appear to be both rare and minor. Crocodilians do not have a connection between left and right atria (p. 24), the site of cardiac influx; the connection (the foramen of Panizza) actually lies between the systemic arches after they leave the ventricles. The homeothermy conferred upon large tetrapods by virtue of their surface-area:volume ratios makes the archaic terms "cold-blooded" and "warm-blooded" meaningless; yet these terms are used. Elsewhere, the author uses the more preferable "endothermy" and "ectothermy," but the latter is not defined. Parental care in squamate reptiles is widespread and more elaborate than the book recognizes. Finally, one might well question whether the distinction between speciation by budding and by bifurcation (p. 63) is at all real, especially in the context of punctuated equilibrium. But these are minor points that do not diminish the value of this book.

Dinosaur Extinction and the End of an Era is a stimulating work that offers a significant challenge to those who maintain that the late Cretaceous extinctions can be attributed to a single causal explanation. Archibald makes no secret of his disagreement with alternative interpretations—not only with the Alvarez asteroid hypothesis, but with those of other paleontologists. By no means the final word on the subject, this book is likely to elicit further discussion and analysis. Fortunately, newly developed study sites in China and in South America that also cross the K-T boundary may offer independent tests of the hypotheses Archibald defines. For the time being, however, this book is the best guide available to the ongoing research, debate, and analysis of how life changed and evolved at the end of the Mesozoic. Whether interested in dinosaurs or in larger theoretical questions about patterns of speciation and extinction, biologists, students, and laypersons will find this book an excellent addition to their libraries. Other books in the *Perspectives in Paleobiology and Earth History* series are also well worth seeking out; they include analyses of extinctions at the end of the Devonian, the Permian, and the Eocene, as well as the early emergence of animals during the distant Cambrian. C/E

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Book Review

The Battle of Beginnings: Why Neither Side is Winning the Creation-Evolution Debate
by Del Ratzch, 1996. InterVarsity Press, Downers Grove IL. 248 pp.

Reviewed by Carl Jay Bajema, Professor of Biology, Grand Valley State University, Allendale, MI 49401 (bajemacj@gvsu.edu)

This book is an attempt by a creationist philosopher (1) to help lay Christians gain a better understanding as to why neither side is winning the creation-evolution debate, and (2) to try to shift the focus of the debate to religious-philosophical issues such as intelligent design. Dr. Del Ratzch, a Professor of Philosophy at Calvin College, wrote this book to make Christians aware of the large number of critical arguments that each side makes that are ineffective either because they are philosophically "defective or because no one holds the views against which they are directed" (p. 12).

The Battle of Beginnings contains chapters on such topics as creationist misunderstandings of Darwin's theory, popular evolutionist misunderstandings of creationist theory, creationist and evolutionist mistakes concerning the nature of science, and the ways in which theistic evolution is attacked by both sides. While the text is heavily documented with 26 pages of footnotes and a 24-page bibliography, it does not contain an index. For some reason the author and/or publisher did not consider the numerous philosophical arguments presented in the book to be valuable enough for them to spend the time preparing and publishing an index to help potential readers.

The book is interesting for two reasons. First, the author presents numerous brief negative critiques of many of the arguments that creationists and scientists have employed in debates. Second, this book is an example of the recent strategy by Phillip Johnson and others to redirect the creation-evolution debate to such religious issues as intelligent design. This review will concentrate on Ratszch's discussion of (1) the imperfect nature of science, (2) design arguments and (3) who is entitled to be called a "creationist."

Scientific Inquiry Is Imperfect

Ratzch presents a brief history of how science has evolved as a method/set of methods for investigating nature (pp. 103-119). The traditional view projected the image that science was supposed to be "thoroughly objective," "empirical," and "utterly rational" (p. 105). The philosophical shortcomings of this traditional view have been pointed out by Karl Popper, Thomas Kuhn, and others. Science is no longer seen as automatically leading directly to truth and certainty.

Ratzsch discusses the basic weakness of Karl Popper's testability criterion for falsifying hypotheses in science. He argues that the fact that scientists test bundles of theories

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rather than just one theory at a time means that when the results of a test contradict the prediction, a scientist cannot be sure which theory is erroneous. Ratzch seems unaware of or unwilling to discuss/use the scientific test design strategy that enables scientists to avoid being caught in the "naive falsification" trap. The philosopher Philip Kitcher has pointed out that "while hypotheses are always tested in bundles they can be tested in different bundles" (Kitcher, 1982, p. 46). Consequently "naive falsification" is not the fatal philosophical problem that Raztch contends it is.

What is "proper" science? Ratzch attacks the position that "proper science can make no reference, no appeal to or explanatory use of anything beyond the purely natural" (p. 162). He argues that naturalism, the position that scientific understanding "must be based on empirical interaction with reality" (p. 163), is erroneous because scientists employ a number of nonempirical philosophical principles. The position that "purely natural (primarily empirical) methods are the only ones that have demonstrated any success and promise historically" (p. 165) is also attacked by Ratzch who contends that no one has done the historical analyses to support this claim. He then contends that adding up the failures or successes of a strategy for gaining an understanding of nature would be irrelevant because history demonstrates that essentially every theory (naturalistic as well as nonnaturalistic) gets abandoned. While Ratzch rationalizes himself into such a sterile philosophical conclusion, other philosophers have been more successful in bringing about a better understanding of science as a very successful way of testing ideas about nature.

Ratzch should have asked himself the following two questions: Why is science as a way of constructing and testing hypotheses so successful? What are the characteristics of a successful science? The philosopher Philip Kitcher asked and answered these questions in his 1982 book *Abusing Science: The Case Against Creationism.* A successful science has three important characteristics: (1) independent testability—the hypotheses can be tested independently of the particular cases for which they were introduced; (2) unification—the result of the application of a small family of problem-solving strategies to a broad class of cases; and (3) fecundity—the capacity of a theory to open up new and profitable lines of investigation. Evolutionary theory is an example of a successful science.

The Argument From Intelligent Design to a Divine Creator

Ratzsch presents a modern version of the classic natural theological argument from design in nature to the existence of an intelligent deliberate divine designer (pp. 192-195). He draws attention to several indicators/rules for concluding that something is the product of intelligent design such as (1) "improbability," (2) "meaning," and (3) "complexity, pattern and the like." Most fundamental, Ratzsch argues, is that "the production of artifacts always involves going sufficiently 'against the flow' of what nature typically produces" (p. 193). This fatally flawed philosophical argument is based on an inadequate understanding of natural selection. This natural ecological process produces designs by selectively multiplying genetic information that programs the chemical reactions in organisms to go "'against the flow' of what nature typically produces."

The religious argument from design championed by the natural theologians was abandoned more than 100 years ago by biologists. Scientific evidence from comparative anatomy and embryology of living and fossil organisms supports the theory that living organisms are the imperfect products of "descent with modification" rather than the instantaneous special creation of perfect and thus divinely intelligent designs. Biologists refer to these imperfect designs for living and multiplying in specific environments as "adaptations."

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Charles Darwin not only proposed but began the process of scientifically testing his theory that adaptations are the outcome of natural and sexual selection. Organisms are adapted for surviving, acquiring resources, and reproduction, that is, converting resources into offspring. There are many reasons why adaptations are imperfect outcomes of evolution such as (1) adaptations involve trade-offs between survival and reproduction, (2) adaptations are the product of remodeling or adding on to an already existing set of adaptations possessed by organisms, and (3) the adaptations are relative to specific local environments which are continuously changing.

Heads I Win, Tails You Lose

Many creationists employ the following religious argument to explain away the problem of "design flaws," as creationists refer to imperfect adaptations. These imperfect adaptations are "design degradations stemming from the Fall" of Adam and Eve which corrupted the original perfect designs (p. 101). While this argument may be an acceptable religious philosophical argument it is not acceptable in science. This waterproof argument (every good design is due to an intelligent creator and every imperfect or morally bad design is due to some evil force) is an excellent example of the swamp of religious doctrines that awaits those who would engage in natural theological arguments in science classes. The philosopher Karl Popper has pointed out that such waterproof hypotheses (hypotheses that are constructed in such a way as to be unfalsifiable) are not scientific. Waterproof hypotheses are more than just nonscientific—they also are not fruitful with respect to the testing and refutation of scientific theories. We cannot afford in science classes to teach religious doctrines that make many individuals feel good while they are doing poorly with respect to understanding science as a way of constructing and testing theories about natural causes and natural consequences of events occurring in nature.

Who Are The "True" Creationists?

According to Ratszch, the only "true" creationists are those individuals who believe the following:

> "Whether or not God could have built evolutionary potentials into the creation, or could have brought about life and all its diversity by evolutionary means, he did not in fact do so. There are thus discontinuities in nature—e.g., non-life/life, reptile/mammal, animal/human—which cannot be crossed by purely natural means, each such discontinuity requiring separate supernatural creative action" (p. 12).

Ratzch obviously has adopted a definition of "creationist" that is based on a particular philosophical interpretation of religious texts contained in Genesis of the Bible. Such a definition excludes "creationists" who are theistic evolutionists, that is, those creationists who believe that God has enabled all of life to evolve via the natural processes that God created. This definition also excludes "creationists" such as American Indians who have their own religious versions of the supernatural deities and supernatural processes involved in creation.

Philosophical battles over who is a "creationist" are beyond the realm of science. However they do provide valuable insights into the nature of the religious political "swamp" that awaits those who would inject arguments from design to a very specific supernatural "cre-

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ator" into science education.

Conclusions

The Battle of Beginnings provides an interesting account of the creationist movement and numerous philosophical shortcomings of arguments employed by creationists and evolutionary scientists. However, the book has numerous major shortcomings. Ratzsch does not bother to provide his readers with an up-to-date account of the modern evolutionary theories that he either rejects or hopes are not accurate descriptions of the natural world. Ratzsch also does a poor job of conveying the fact that scientifically-based inquiries have been very successful in bringing about a better understanding of the natural world. These scientific successes have occurred in spite of the philosophical problems associated with the fact that scientists are imperfect human beings who often have incorporated their philosophical prejudices into hypotheses and the fact that it often takes numerous failures of scientific tests before many scientists will abandon particular versions of scientific hypotheses/theories.

Science is a very special successful set of research strategies for constructing and testing hypotheses/theories concerning natural causes and natural consequences of events occurring in nature. Scientists need to help students gain a better understanding of the critical thinking skills involved in science. Scientists employing these critical thinking skills have made numerous advances in the scientific understanding of the nature of genetic variation. Scientific analyses have provided us with a better understanding of the power of natural (including sexual) selection to bring about adaptive changes in genetic information carried by individuals in populations. Scientifically valid observations concerning the fossil record and the comparative biology of living species continue to provide evidence that is consistent with Charles Darwin's theory of "descent with modification" by natural selection.

It would be nice if we scientists could concentrate on just "doing and evaluating science" and let creationist philosophers haggle over who is a creationist and who is not, and battle over how their particular versions of God created living organisms and other philosophical issues. However, we do not have the luxury of totally ignoring what creationist philosophers are doing because too many of them are working very diligently to get their religiously-based doctrines taught in science classes.

Reference

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Book Review

Darwin's Dangerous Idea: Evolution and the Meanings of Life
by Daniel C. Dennett, 1995, Simon & Schuster, New York, 586 pp., bibliography, index.

Reviewed by Danny Yee, Department of Anatomy & Histology, University of Sydney

Evolutionary ideas appear in many places in Daniel Dennett's earlier writings; he is one of the few philosophers who really seem at home with them. In *Darwin's Dangerous Idea* he turns his attention directly to the idea of evolution by natural selection, trying to explain why so many of his fellow philosophers (and even some biologists) have shied from accepting its full ramifications. Dennett begins by offering a description of Darwinian theory at an abstract philosophical level. He then looks at how this perspective sheds light on some controversies within evolutionary biology and finally at its consequences outside biology for social and moral philosophy.

Dennett is remarkably difficult to summarize, because he crams so much into his books and presents much of his most interesting material as digressions. Darwinian evolution has a huge range of applications (Dennett calls it a "universal acid"), and taking it as his subject gives him the opportunity to range across science and philosophy, introducing bits and pieces of all kinds which he has picked up and thinks are worth sharing. As a result the volume as a whole seems a little disconnected, but more locally ideas are logically and clearly presented.

Dennett begins by explaining why he thinks Darwin deserves the prize for the "single best idea anyone has ever had" and why his idea was (and is) so revolutionary, so dangerous. He illustrates this with a brief account of pre-Darwinian ideas—with Locke as an exponent of the traditional viewpoint and Hume as someone who came very close to Darwin's insight. The key elements of Darwin's "dangerous idea" are a denial of essentialism and an understanding of natural selection as a substrate neutral, algorithmic process, applicable to an extremely wide range of phenomena and capable of achieving immense feats by slow accumulation over large expanses of time and space.

Darwin's original application of natural selection was, of course, to the origin of species. Dennett explores different ways of visualizing the "tree of life" and explains the problems involved in defining species (decisions about species status are necessarily retrospective). This is illustrated with an explanation of the often misunderstood "Mitochondrial Eve" phenomenon. At this point Dennett introduces a metaphor which is used throughout the book: "cranes" are devices or "good tricks" that allow design to proceed faster, but which build on existing foundations; "skyhooks" are entirely mysterious, pre-existing mechanisms which enable some problem to be solved or some complexity to be created entirely independently of ordinary processes of design. Dennett argues that there is no place at all for skyhooks and that the only bad reductionism is a "greedy" reductionism that tries to do

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without cranes.

Evolution can be seen as movement within the "Library of Mendel," the set of all possible genomes, of which only a tiny fraction actually exist. The complex constraints imposed on genomes by developmental biology and ecology reflect relative degrees of accessibility within the library—the accessible is a small subset of the possible, albeit a much bigger one than the actual. Dennett goes on to argue that this can be extended outside biology, that all design can be seen as movement through a single unified "Design Space." Human creativity is no exception, and Paley's "watchmaker" analogy had more truth than it is usually credited with.

Part two of *Darwin's Dangerous Idea* looks at attacks on and extensions of Darwinism inside biology. Darwin himself carefully restricted the domain to which he was prepared to apply his theory, but Dennett argues that continuing to do so (at the behest of religion or otherwise) is no longer a tenable position to take. He briefly discusses two extensions: to the origin of life (focusing on the ideas of Cairns-Smith and Eigen) and to cellular automata (Conway's game of life). Though there are obvious differences between those things produced by human design and those produced by evolution, biology *is* engineering at some fundamental level, and "reverse engineering" is a powerful tool for biologists. This creates a connection between two difficult concepts—"function" in biology and "meaning" in philosophy. Dennett fits work by Kauffman on self-organizing systems into this framework, arguing that it is an extension of Darwinism rather than a rebuttal.

A whole chapter is devoted to exploring the power of adaptationist thinking and its centrality to understanding evolution. While he rejects Leibnizian "panglossianism," Dennett sees adaptationism as a fertile source of explanations; even if specific explanations are not always correct, the general power of adaptationism is not diminished. (This is illustrated by a brief look at the Aquatic Ape Theory, as an example of an unestablished, controversial, but interesting *adaptationist* hypothesis.)

This discussion is followed by a chapter devoted almost solely to Stephen Jay Gould. Dennett continues his argument for the power of adaptationism with an attack on its most famous critique, Gould and Lewontin's famous "Spandrels of San Marco" paper. Dennett's basic argument is that Gould and Lewontin's arguments are misaimed, that "genuine" Darwinians have always shunned both panadaptationism and preadaptationism and that "good adaptationists are always on the lookout for hidden constraints." Punctuated equilibrium is next against the wall, along with Gould's analysis of the Burgess Shale (in *Wonderful Life*) and his arguments for the contingency of evolution.

Dennett's conclusion from all of this is that Gould is "searching for skyhooks to limit the power of Darwin's dangerous idea." This prompted a bit of soul-searching on my part and some rereading of Gould's works, but I think that Dennett is wrong about this. While there are passages in Gould's writings that can be read to support Dennett's view, it seems clear to me that Gould's overriding drive is not a search for skyhooks but rather an insistence on the complexity and diversity of the cranes involved in evolution. All the different forms of heterochrony Gould discusses in *Ontogeny and Phylogeny*, for example, are clearly cranes, and if he is more complimentary than some to historical figures who were clearly looking for skyhooks, that says more about his historiographical sensibilities than his own philosophy. Gould is no closer to any form of vitalism or mysticism than someone like Dawkins is to "greedy reductionism." Perhaps Dennett sees things from too high above the fray of actual biology. While he acknowledges that cranes come in many types and that they interact in complicated ways, his cranes-versus-skyhooks abstraction subsumes the whole of biology into "cranes," leaving plenty of room for major disagreements which are simply invisible at this level.

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On a similar note, Dennett rings a wrong note when he claims that only "greedy" reductionism (trying to do without cranes) is bad and that attacks on reductionism are either vain attempts to find skyhooks or aimed at unrealistic portrayals of reductionism. The most widespread forms of reductionism are those that try to restrict the kinds of cranes used or that place excessive stress on particular cranes (typically privileging genetics above ecology and embryology or physics above everything else). These kinds of reductionism may not be a problem philosophically, but they are definitely a menace elsewhere.

Dennett goes on to deal with other more harmless "heresies," though at much less length: Hoyle's idea that the earth was seeded with life, aliens meddling with evolution, Teilhard de Chardin, and recent Lamarckian revivals. I'm not convinced most of these merited even this much attention. Dennett also offers a very brief look at the debate about the level and units of evolution. He argues that, while this is important, it doesn't impinge on the fundamentals of Darwinism as he has presented them.

One of the reasons Darwinian heresies are so widespread inside biology is that many people desperately want to stop the application of Darwinism to humans and therefore seize any chance they can to undermine it. In part three of *Darwin's Dangerous Idea* Dennett looks at how the extension of evolutionary ideas outside biology has been resisted in fields like linguistics, philosophy, and ethics. This will be the most interesting material for many, especially those already familiar with the biological theory in parts one and two.

The application of Darwinism to culture rests on the concept of memes, concepts or ideas that are propagated from person to person and "compete" with one another. They provide a basis for culture and allow us to transcend our genetics. While Dennett doubts that a science of memetics with the power of genetics is possible, at a basic level genetics and memetics work on the same principles—design by unthinking processes of selection. Human culture is a "crane-making crane," not a set of "skyhooks;" indeed there are no "skyhooks" in culture any more than there are in biology.

A chapter on meaning and intentionality takes up the link between biological definitions of function and philosophical definitions of meaning introduced in part two. Dennett deploys three complex but compelling (and, as always, entertaining) thought experiments, aimed at demonstrating that there can be no distinction between "real" meaning and "artificial" meaning, that ultimately all meaning emerges from meaningless processes. Drifting a little from evolution, he then devotes a chapter to explaining why "attempts to use Goedel's theorem to prove something important about the nature of the human mind" are inherently flawed and to demolishing Penrose's "refutation of strong AI" (in *The Emperor's New Mind*).

Dennett spends two chapters on the origins of morals, arguing, of course, for a naturalist position. While the excesses of some sociobiologists ("greedy reductionists") are deplorable, that is no ground for rejecting an evolutionary origin for morality. Once again Dennett finds time for a quick look at the history of moral philosophy, placing Hobbes and Nietzsche as early sociobiologists. He goes on to address an important practical issue: both utilitarian and Kantian ethical systems tend to be idealized to the point where they are useless; construction of a practical "Moral First Aid Manual" will require taking into account real computational complexities.

In a brief final chapter Dennett explains how Darwin's dangerous idea has influenced his political and ethical beliefs. He sees it as a basis for assigning value to diversity, whether artistic, cultural, or biological. While some have seen it as conducive to conservative politics, Dennett thinks otherwise, ending with a vision very much in the liberal tradition.

Like Dennett's earlier books on free will and consciousness, I fear *Darwin's Dangerous Idea* is too complexly argued to make many converts. Some will quibble at minor

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points and dodge the basic argument; others will become lost in the detail. While it doesn't require a technical background, it is not going to be easy reading for those without a basic sympathy for Dennett's way of looking at the world, and I would recommend reading Dawkins's *The Selfish Gene* before tackling *Darwin's Dangerous Idea.*

For many, however, *Darwin's Dangerous Idea* will be a volume to read slowly and to savor. Arguably there are few original ideas in it (at least for someone who has read Dennett's earlier works and has a grounding in evolutionary biology), but few readers will fail to find something new, or perhaps some familiar ideas in new contexts. Many books have been written about natural selection, but few have applied it across such a wide swath of philosophy. Though I disagree with the odd detail, I think that Dennett's basic argument is inexorable, inescapable, and fully as potent as he claims it is. He has produced a vastly more sophisticated version of the bonfire the positivists wanted to make of the cobwebs of metaphysics, and any philosopher who wants to talk sensibly about design or meaning must pass through its flames.

Acknowledgments: thanks to Cosma Shalizi for comments on a draft of this review.

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Book Review

The Secret Chain: Evolution and Ethics by Michael Bradie, 1994. State University of New York Press, Albany, NY, 199 pp., $14.95, paper.

Reviewed by Arthur Shapiro, Center for Population Biology, University of California, Davis

In 1896 Herbert Spencer wrote a retrospective review of his 1851 work *Social Statics*, crafted as if written at that time by an independent and sophisticated critic. In that review he wrote:

> [M]erely putting at the back of immutable law a divine idea... practically amounts to nothing; the immutable law might stand just as well by itself. *Social Statics*...might fitly be characterized as a kind of Natural-History ethics....[A]ssuming happiness as the end to be achieved, it regards achievement of it as dependent on fulfillment of conditions, conformity to which constitute morality.

Spencer was neither the first nor the last to wrestle with the problem of the origins of morals. It is a problem intimately intertwined with the idea of evolution. Religious opponents of evolution, and many secular ones as well, worry not about the quality of the science involved (however much they may protest to the contrary), but about its role in undermining the moral authority of religion. If values come from a God, or gods, their authority is beyond question to believers. When society contains a significant number of unbelievers, that authority slips away. Scientific materialism in general, and evolution in particular, are perceived as eroding the base of believers, thereby putting society at risk of moral anarchy: "If there is no God, everything is permitted." Many evolutionists, to their intellectual discredit, fail to realize the seriousness of this argument, or they are so put off by its functionalist slant that they are willing to throw out the baby with the proverbial bath water.

If biology has indeed supplanted theology, can we derive morals from biology itself? There have been numerous attempts to do exactly that—all of them failures. This book by a professor of philosophy at Bowling Green (Ohio) University is a history and critical review of that tradition from the Enlightenment to the present. It is illuminating and successful at showing that the actual number of distinct ideas in the tradition is quite small. The options for its further development thus appear severely constrained.

The biggest problem has been and still is the "naturalistic fallacy"—the lack of any logical basis from translating "is" to "ought to be." There have been recent, and pitiful, attempts to deny that the naturalistic fallacy *is* a fallacy. It is a far cry from saying "it is natural for humans to do X" to saying "Humans should (or should not) do X, because it is natural." Various religions have been doing the latter for a long time; it is foolish for either

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secular philosophers or evolutionists to emulate them.

Bradie presupposes the truth of evolution, so his book will not sit well with religious anti-evolutionists. He draws reasonable connections between evolutionary ethics and evolutionary epistemology, but there are critical differences. He has important and novel insights about many of the thinkers he discusses (I was particularly entranced with his comments on Spencer and Kropotkin), but his summation and synthesis come out neither radical nor optimistic for an evolutionary ethics.

Many secular humanists seem mired in the soupy, idealistic middle-brow milieu of the fifties, with *Saturday Review* on the coffee table, a bake sale at the Unitarian Church/Friends Meeting/Jewish Community Center, and a comforting haze of general goodwill. They basically want the cozy parts of Judaeo-Christian morality to persist, while Judaism and Christianity (and other troublesome ideologies) wither away and die. But things are much harder-edged now, and just being nice doesn't wash. On one hand, we have the postmodernists arguing themselves into an infinite moral regress by claiming that there are no absolutes and that all claims to objectivity are self-serving power ploys. On another we have the newly-invigorated theists, seizing on post-modern malaise to argue that there is *no* moral authority *but* revealed truth. Neither will let one get away with defending mere decency unjustified by ideology. Perhaps that is why there is so little decency left around. *The Secret Chain,* while offering no solution, will make it harder to wrap one's moral self in Darwinism. C/E

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Zubrow E. *Archaeoastronomy*. Orlando, FL: Academic Press, 1985.

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extinction by J. David Archibald. The book explores such questions as how we know when a species really is extinct and how extinction is exhibited in the fossil record. Archibald agrees that an asteroid may have given a final boot to the remaining dinosaurs, but argues that the decline of these reptiles was a complicated and lengthy process.

We often hear it said around NCSE that the issues in the "debate" between creationist and evolutionary explanations keep coming back around over and over. Carl Bajema's review of Del Ratzch's *The Battle of Beginnings* confirms this. A lot goes on in this book, but Bajema tells us that one of the main themes is to shift the discussion away from religious ideas to the more general notion of "intelligent design." There is also an interesting discussion on who really qualifies (in Ratzch's view) as a "true" creationist.

We are also pleased that our colleague from Down Under, Danny Yee, has provided us with a thorough and thoughtful review of Daniel Dennett's recent book, *Darwin's Dangerous Idea*. This is an idea-packed book, Yee tells us, but worth the work of following the threads and untangling the webs of ideas that the concept of evolution developed by Darwin has woven into many areas of our scholarly and political lives.

Finally, Arthur Shapiro provides us with a review of *The Secret Chain*, by Michael Bradie. The author explores the evolution of moral behavior and ethics. Could they have arisen by natural means alone; must they have? While Bradie doesn't see naturalistic models as leading to total anarchy and moral decay, Shapiro tells us that the author's optimism for such models is not overwhelming.

We hope that the 39-issue run of *Creation/Evolution* has been informative and helpful in its discussion of salient issues in the on-going controversies. We expect to continue this tradition in *Reports of the National Center for Science Education* which will premier in February, 1997. If you don't have a complete set of *Creation/Evolution* and would like one, check the back cover of this issue for details on how to complete your collection. We look forward to seeing you from the inside of our new publication in a few months.

— *Andrew J. Petto*

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